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Celiac Disease Prevalence In Patients With Type 1 Diabetes From Saudi Arabia

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Abstract

Celiac disease (CD) has a recognized association with type 1 diabetes. T1DM is an AD in which insulin deficiency results from the destruction of pancreatic beta cells caused by the autoantibodies. Aims: The research aims to study the prevalence of celiac disease in patients with type 1 diabetes, and to study digestive symptoms in patients with diabetes in general, because the early diagnosis of celiac disease, which is attached, prevents complications for both diseases and helps in controlling blood sugar. Subjects and Methods: A descriptive research design was utilized to gather information about screening practices for celiac disease in patients with type 1 diabetes. This present study was carried out in the Clinics of Pediatric Gastroenterology and Endocrinology. 92 patients with type 1 DM were included in the study. Results: Findings indicate that prevalence of CD was about 11.95%(11/92) in Saudi Arabia .There is no gender differences (between males and females). The difference between the two groups in Diabetes duration was significant. Diabetes duration for Celiac disease positivity group was 12.42. , while for Celiac disease negativity group was 15.02(p-value smaller than .05).Flatulence, loose stools and diarrhea ere the most common clinical symptom in patients with type 1 diabetes, regardless of antibody positivity or negativity. There is a significant difference between the two groups in Hb(p-value smaller than .05) and Ca(p-value smaller than .05). Conclusion: This study confirms that the celiac disease is common in type 1 patients with diabetes.

Keywords Celiac disease, prevalence ,Patients with type 1 diabetes,Saudi Arabia

Introduction

Celiac disease (CD) is an immune-mediated systemic disease triggered by gluten intake in genetically susceptible individuals and affects approximately 1% of the general population.[1]. CD is a protein present in rye, wheat, and barley. When gluten enters the gastrointestinal tract, it reduces into a peptide known as gliadin, which is harmful to celiac patients and predominantly produces gastrointestinal symptoms, mediated by tissue transglutaminase antibodies (tTG), as an Immunoglobulin A (IgA) response.[2].

Celiac disease (CD) has a recognized association with type 1 diabetes. T1DM is an AD in which insulin deficiency results from the destruction of pancreatic beta cells caused by the autoantibodies. This insulin deficiency leads to higher levels of blood glucose[3] . Both T1DM and CD are marked by the selective destruction of β cells of islets and enterocytes respectively .They shared genetic background of T1DM and CD has been well documented based mainly on the presence of the HLA class II genes as DQ2 and DQ8, as they are present in 95% of patients with T1DM

and almost 99% of celiac patients (compared to 40% of the unaffected population), representing a significant risk factor for both diseases[4].

In an Australian study, Craig et al. [5] found that CD was present in 1,835 youths (3.5%) and was diagnosed at a median age of 8.1 years (interquartile range 5.3-11.2 years). Diabetes duration at CD diagnosis was <1 year in 37% of youths, >1-2 years in 18% of youths, >3-5 years in 23% of youths, and >5 years in 17% of youths. CD prevalence ranged from 1.9% in the T1DX to 7.7% in the ADDN and was higher in girls than boys (4.3% vs. 2.7%, P < 0.001). Children with coexisting CD were younger at diabetes diagnosis compared with those with type 1 diabetes only (5.4 vs. 7.0 years of age, P < 0.001) and fewer were nonwhite (15 vs. 18%, P < 0.001). Height SDS was lower in those with CD (0.36 vs. 0.48, adjusted P < 0.001) and fewer were overweight/obese (34 vs. 37%, adjusted P < 0.001), whereas mean HbA1c values were comparable: 8.3 ± 1.5% (67 ± 17 mmol/mol) versus 8.4 ± 1.6% (68 ± 17 mmol/mol).

Significance

Patients with type 1 diabetes who have concomitant celiac disease are at increased risk of hypoglycaemia[6], microvascular injuries[7], and a high death rate in general[8]. Therefore, most guidelines recommend programmed screening for celiac disease in patients with type 1 diabetes[9], where failure to detect celiac disease associated with type 1 diabetes exposes affected individuals to an increased risk of growth failure, osteoporosis, infertility and gastrointestinal lymphoma[10]. As for early investigation and diagnosis, they help in organizing insulin therapy and achieving good blood sugar control and reduces complications of the two diseases[11].

Purpose

The research aims to study the prevalence of celiac disease in patients with type 1 diabetes, and to study digestive symptoms in patients with diabetes in general, because the early diagnosis of celiac disease, which is attached, prevents complications for both diseases and helps in controlling blood sugar.

Subjects and Methods

Study design

A descriptive research design was utilized to gather information about screening practices for celiac disease in patients with type 1 diabetes. This present study was carried out in the Clinics of Pediatric Gastroenterology and Endocrinology. 92 patients with type 1 DM were included in the study.

Patients with concomitant autoimmune diseases and patients who refused to participate were excluded from the study. Patients were evaluated in terms of clinical and laboratory findings of CD. Tissue transglutaminase antibody IgA (tTG IgA) and total IgA levels were measured in all patients (1). The normal range of tTG IgA and EMA IgA is below 20 U/L. The cutt-off value of IgA level is 5 mg/dL. Tissue transglutaminase antibody IgG was analysed in patients with IgA deficiency . Statistical analysis was performed using SPSS software version 18.0. A p value less than 0.05 was considered statistically significant. For the pathological evaluation of endoscopic biopsies standard criteria defined by Marsch were used.

Study population

The study included 92 patients (females 34 , 36.9 %, males 57, 63.1%) with type

1 diabetes who attended the Clinics of Pediatric Gastroenterology and Endocrinology. They were aged from 13-22 years old.(M= 16.7, SD= 4.3).

Patient's selection

Inclusion criteria

- Each patient >12 years old is diagnosed with type 1 diabetes

Exclusion criteria

- Patients not willing to participate
- Patients with concomitant autoimmune diseases.

Organizing and following up on patients

- Selecting patients according to the inclusion criteria and obtaining their consent to enter the study
- Detailed clinical history including type 1 diabetes, age at diagnosis, response to treatment and complications if they occur.
- Recording the accompanying digestive symptoms (if any) such as (diarrhea - weight loss - lack of appetite....etc), and calculating the Body Mass Index for each patient.
- Conducting general analyzes including (general count and formula, glucose, calcium, albumin).
- Conducting Anti TTG of IgA with ELISA with measuring IgA
- Selecting children with positive Anti TTG or those poor in IgA . All biopsies were evaluated according to the Marsh classification criteria.
- Linking the previous data and recording it within the search form

Patients were divided into two groups: Celiac disease positivity group(N=18 patients) and Celiac disease negativity group (N=72 patients).

Results

Prevalence of clinical symptoms among the study patients

Patients were asked about the presence of clinical symptoms, including gastrointestinal. These were documented as shown in Fig 1. As shown in Fig 1., 52.17% suffer from flatulence, 31.52% from loose stools, 33.69% from constipation, 14.13% from indigestion, 5.43% from diarrhea, 13.04% from weight loss, and47.82% show no gastrointestinal symptoms or complaints.

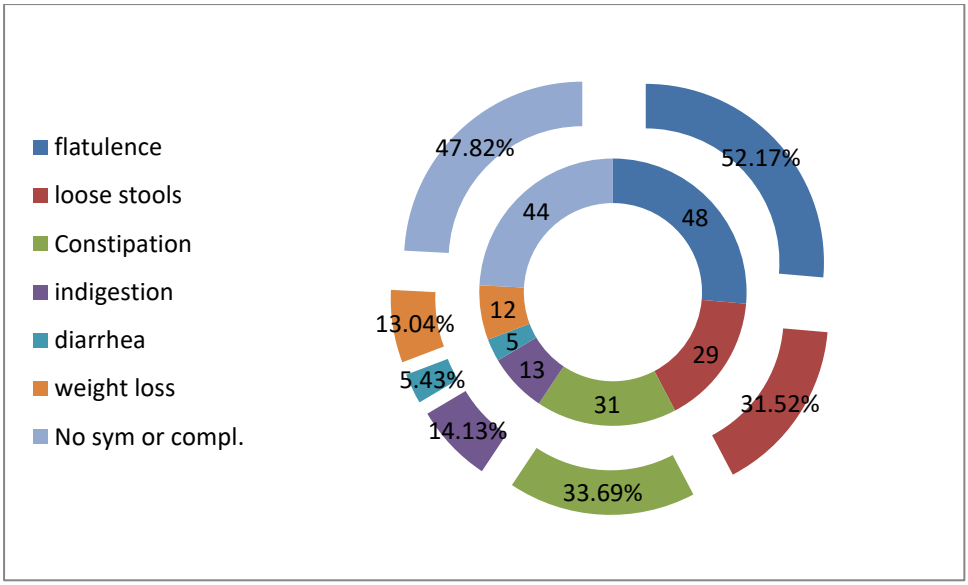

Figure 1. **Symptoms and complaints of patients with type 1 diabetes mellitus**

Anti TTG IgA and IgA were performed to all patients . All IgA results were between 137.7-360 mg/dl . All values were <70 mg/ dl . No patient was poor in IgA. There were 12 seropositive patients.

The prevalence of biopsy proven celiac disease

As shown in table 1., doudenal biopsy samples of these patients revealed grade 3a in 2 patients and 3b in 1 patients according to modified Marsh classification. It is estimated that prevalence of CD was about 11.95%(11/92) in Saudi Arabia (in the study sample).

Table 1. Marsh Classification for study group

Marsh Grade	No.	Percent %
0	0	0
1	0	0
2	0	0
3a	7	7.60%
3b	4	4.34%
3c	0	0

Multiple comparisons

Table 2. shows comparison of demographic variables, clinical symptoms and lab tests between Celiac disease positivity group(N=18 patients) and Celiac disease negativity group (N=72 patients. As shown in table 2, there is no gender differences (between males and females). The difference between the two groups in Diabetes duration was significant. Diabetes duration for Celiac disease positivity group was 12.42. , while for Celiac disease negativity group was 15.02(p-value smaller than .05).Flatulence, loose stools and diarrhea ere the most common clinical symptom in patients with type 1 diabetes, regardless of antibody positivity or negativity. There is a significant difference between the two groups in

Hb(p-value smaller than .05) and Ca(p-value smaller than .05).

Table 2. clinical features of EMA positive and EMA negative groups

Variable	Celiac disease positivity group(N=18 patients)	Celiac disease negativity group (N=72 patients)	P. value
	Gender		
Males	35±6,13	5±3,22	0.09 not significant
Females	37±5,88	3±2,19	
Age	14±2,16	11±4,33	0.002 significant
Diabetes duration (year)	12.42±4,15	15.02±5,10	0.004 significant
	Digestive symptoms		
flatulence	35.7%	36.0%	0.074 not significant
loose stools	31.8%	30.9%	.061 not significant
constipation	1.0%	0.0%	.087 not significant
indigestion	1.0%	0.0%	.087 not significant
diarrhea	18.1%	17.9%	.098 not significant
weight loss	1.0%	0.0%	.087 not significant
	lab tests		
Hb	0.7 ± 9.6	1.3 ± 8.9	0.002 significant
Albumin	0.3 ± 3.8	0.4 ± 3.2	0.074 not significant
Ca	0.8 ± 6.3	0.5 ± 4.2	0.002 significant

Discussion

The research aims to study the prevalence of celiac disease in patients with type 1 diabetes, and to study digestive symptoms in patients with diabetes in general, because the early diagnosis of celiac disease, which is attached, prevents complications for both diseases and helps in controlling blood sugar.

Findings indicate that prevalence of CD was about 11.95%(11/92) in Saudi Arabia .There is no gender differences (between males and females). The difference between the two groups in Diabetes duration was significant. Diabetes duration for Celiac disease positivity group was 12.42. , while for Celiac disease negativity group was 15.02(p-value smaller than .05).Flatulence, loose stools and diarrhea ere the most common clinical symptom in patients with type 1 diabetes, regardless of antibody positivity or negativity. There is a significant difference between the two groups in Hb(p-value smaller than .05) and Ca(p-value smaller than .05).

I have confirmed this association by demonstrating an increased prevalence of CD in type 1 diabetic children in Saudi Arabia. It is estimated that prevalence of CD was about 11.95% in Saudi Arabia (in the study sample). In this cross sectional study , it was determined that the overall prevalence of celiac disease in

type 1 diabetic patients(sample of this study) was nearly 11.95% (11/92).

Many similarities between DM1 and CD, such as underlying genetic susceptibility associated with HLA class II and autoimmune phenomena[12]. Both diseases were associated with a high frequency of HLA DQA1* 0501 and DQB1*0201 (DQ2) molecules worldwide[12]. The CD prevalence that was found by serology in other studies was as follows: Sweden, 4.6%[13]; Italy, 4.5% [14]; Czech Republic, 4.1% [15]; United Kingdom, 4.8% [16]; Austria, 5.1 [17]; Canada, 5.1% [18]; United States of America, 4.6% [19]; Brazil, 8.7% [20]; Tunisia, 8.3% [21]; Spain, 13.4% [22]; Turkey 20.8% [23]; and the north of Iran, 14.28% [24].

European studies have generally found CD in 4% of children with type 1 diabetes [25,26], and many diabetic clinics routinely screen their patients for CD. It was estimated that the disease is more frequent and can sometimes present with atypical symptoms like iron deficiency anemia, infertility, malignancy or neurological disorders[27].

Conclusion

In conclusion, to the best of our knowledge, this is the first study to examine the prevalence of celiac disease in patients with type 1 diabetes, and to study digestive symptoms in patients with diabetes in general in Saudi Arabia. There are no uniform practices for screening for celiac disease in type 1 diabetes in Saudi Arabia . This study confirms that the celiac disease is common in type 1 patients with diabetes. The data lend support to recommend regular screening for CD in all patients with T1DM. Screening of all the type 1 diabetics for antibody positivity at diagnosis and presence of symptoms is recommended.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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