

FREQUENCY OF IMPAIRED GLUCOSE TOLERANCE TEST IN CHILDREN WITH CELIAC DISEASE

Jamal Anwer,¹ Mubarak Ali,¹ Sardar Ali,¹ Ashiq Hussain,¹ Qasim Mahmood¹

ABSTRACT

Background: Oral Glucose Tolerance test among children with celiac disease may help in management. **Objective:** To determine the frequency of impaired Oral Glucose Tolerance test in the children with celiac disease. **Methodology:** Study design: Cross – Sectional study. Place and duration of study: Department of Paediatric including Sheikh Zayed Medical College / Hospital, Rahim Yar Khan from 22nd April 2014 to 18th June 2015. In this study 77 patients of celiac disease were included. Oral glucose tolerance test was performed and noted. The Performa was filled and record was maintained. The data was entered and analyzed for frequency of impaired OGTT by using SPSS version 16. **Results:** In our study, we found that out of 77 patients of celiac disease, 9 (11.7%) patients were having impaired OGTT. **Conclusion:** Impaired OGTT is frequent in children suffering from celiac disease. It can be used as monitoring tool for glycemic abnormalities in these patients. It will help in earlier detection and initiation of prompt management accordingly.

Keywords: Frequency, Oral Glucose Tolerance Test, Celiac disease, Children

JSZMC 2016;7(3):1024-1026

INTRODUCTION

Celiac disease is an autoimmune disorder affecting primarily the small intestine that occurs in people who are genetically predisposed.¹ The HLA DQ2 is found in about 80 % of patients with Type 1 DM and in almost 100% of down syndrome children, who are also suffering from celiac disease.^{2,3} The onset of the disease is often between six months to two years of age with the classic symptoms of chronic diarrhea, abdominal distention, loss of appetite and failure to thrive. It is associated with other autoimmune disease, such as disease throiditis and dermatitis herpetiformis etc.^{1,4} Celiac disease is caused by a reaction to gluten, a proteins found in wheat and in other grains such as barley and rye. Diagnosis is made by a combination of serological tests and intestinal biopsies. The only effective treatment is a lifelong restriction of gluten containing diet, which leads to clinical and histopathological recovery in addition to reducing the risk of long term complications including intestinal lymphoma and autosplenectomy.^{1,4} Celiac disease is slightly more common in women than in men. It is estimated that about 7% of children with Type 1DM develop celiac disease within 6 years of diagnosis and the incidence of celiac disease is significantly higher in children under 4 years of age and in girls.⁴

Investigations required to make a diagnosis of

celiac disease included serological blood test and biopsy.⁵ The sensitivity depends upon the degree of histological lesions. People who have minor damage of the small intestine may have seronegative findings so these patients are often missed. In patients with villous atrophy, anti-endomysial antibodies of the immunoglobulin A (IgA) can detect coeliac disease with a sensitivity and specificity of 90% and 99%, respectively. Serology for anti-transglutaminase antibodies (ATG) was initially reported to have a higher sensitivity 99% and specificity of more than 90%. Both EMA and tTG antibodies are useful as screening tests.⁶ This study was conducted to determine the frequency of impaired glucose tolerance test among children with celiac disease.

METHODOLOGY

This was a cross sectional study conducted in Paediatric ward of Sheikh Zayed Medical College / Hospital, Rahim Yar Khan. The study was conducted from 22nd April 2014 to 18th June 2015.

Glucose tolerance test: In oral glucose tolerance test (OGTT), a standard dose of glucose is taken by mouth and after two hours blood levels are checked. Since 1970s, the World Health Organization and other organizations related to diabetes, agreed on a standard dose and duration.

Preparation: Usually the OGTT was performed in the morning because glucose metabolism can exhibit a diurnal rhythm with a significant decrease in the

1. Department of Pediatrics, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, University of Health Sciences Lahore, Pakistan.

Correspondence: Dr. Jamal Anwer, Associate Professor, Department of Pediatrics, Sh. Zayed Medical College / Hospital, Punjab, Rahim Yar Khan.

E-mail: drjamalanwer200@yahoo.com

Mobile:+92-3007829858

Received: 13-07-2016

Accepted: 20-07-2016

afternoon. Prior to the tests, the patient was instructed to fast for 8–12 hours.

Procedure:

1. A baseline (zero time) blood sample was taken.
2. Afterward the patient was given a measured dose of glucose solution to drink within 5 minute.
3. The samples of blood was drawn at intervals for measurement of glucose. For simple diabetes screening, the most important sample is the 2 hour sample. So the 0 and 2 hour samples may be the only required samples.

Dose of glucose: WHO recommended 75g of oral glucose.

Test Result Description

- Fasting plasma glucose should be below 110 mg/dL. Fasting levels between 110 and 125 mg/dL are borderline indicate “Impaired fasting glycemic” and fasting levels repeatedly at or above 126 mg/dL are diagnostic of diabetes.
- For a 2 hour GTT (Glucose Tolerance Test) with 75g intake, a glucose level below 140 mg/dL is normal. Plasma glucose between 140 mg/dL to 200 mg/dL indicate "tolerance “and the level more than 200 mg/dL at 2 hours confirm a diagnosis of diabetes.

Sample method: Venous sample by venous puncture or capillary sample.

Study Subjects: All the consecutive children with celiac disease and age between 2 to 15 years

Exclusion criteria: Children with malabsorption syndrome other than celiac disease. Age below 2 years or above 15 years. Parents who have not given the consent. The approval of study was sought from the Institutional Review Board. The data was entered and analyzed by using SPSS version 16.

RESULTS

Out of 77 patients, 9 (11.6%) were having abnormal results of oral glucose tolerance test. These results showed that 68(88.3%) patients of celiac disease were having normal GTT while 9(11.7%) patients have abnormal results of oral glucose tolerance test (Figure I). The patients between 2 to 10 years of age were 44.44% and between 10 to 15 years were 55.56%. Out of these

patients with abnormal GTT, 33.33% were boys and 66.66% were girls. (Figure II)

Figure I: Number of patients with normal and abnormal OGTT

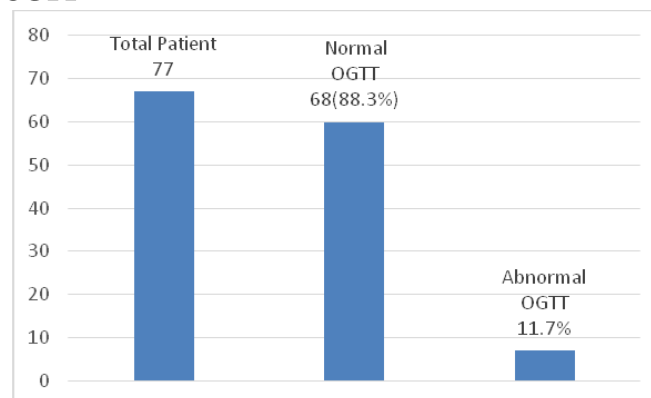
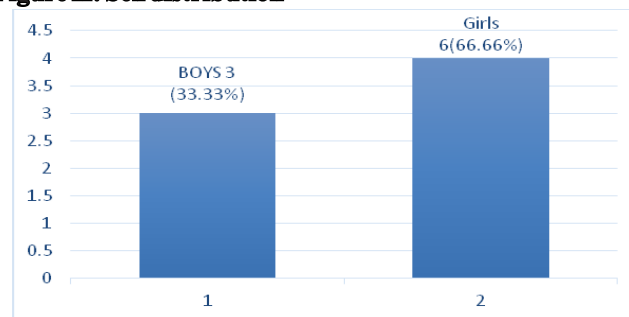


Figure II: Sex distribution



DISCUSSION

Although there is strong association of celiac disease and diabetes mellitus, however there are very few studies from our country on OGTT for monitoring and diagnosis of glycemic abnormalities in the patients of celiac disease. There are many associated conditions in celiac disease including hyperthyroidism, DCMP, dermatitis herpetiformis, pernicious anemia etc.¹⁴ Ghawil M, Miotti V, et al reported a Libyan 15-y-old boy affected by silent celiac disease having abnormalities in glycoregulation.² The prevalence of thyroid and celiac disease autoantibodies is high among Type 1 DM patients.^{7,8,9} Banin P, Perretta R et al found that celiac disease can induce an autoimmune process against the beta cells of pancreas which disappears after a gluten-free diet.¹⁰ Camarca ME, Mozzillo E et al found that untreated celiac disease is associated with abnormalities of intestinal and pancreatic hormone secretion and impaired glucose tolerance. These abnormalities are improved by gluten withdrawal.¹¹ Cooper BT, Walsh CH et al found that abnormal GTT may be found in patients of celiac

disease which disappears after gluten free diet.¹² Pekka Collin, Katri Kaukinen et al found 2–5% of patients with insulin-dependent diabetes mellitus or autoimmune thyroid disease.¹² R. Tortora, P. Capone et al found that patients with coeliac disease have a high risk of metabolic syndrome 1 year after starting a gluten-free diet.¹³ Maria Erminia Camarca, Enza Mozzillo et al and C Goh and K Banerjee, in their studies found the association of celiac disease and T 1 DM.^{14,15} They recommend the screening of diabetes in patients of celiac disease. Mansour AA, Najeeb AA et al reported that frequency of silent CD in Iraqi patients with T1DM is not rare, reaching up to 11.2%. Both EMA and tTG antibodies are useful as screening tests.¹⁶ Franco Cerutti, Graziella Bruno et al provided data that the prevalence of biopsy-confirmed celiac disease in children and adolescents with type 1 diabetes is high 6.8%.¹⁷ The HLA DQ2 is found in 80 % of patients with T1 DM and in almost 100% of down syndrome children, who were also suffering from celiac disease. This finding is supported by Larsson K, Carlsson A et al in their study.¹⁸ Greco D, Pisciotta M et al found that Celiac disease diagnosis often followed onset of Type 1 DM, particularly in young female patients.¹⁹

CONCLUSION

There is high frequency of abnormal oral glucose tolerance test among children with celiac disease. The child suffering from celiac disease is at higher risk of developing diabetes. In these patients regular and frequent glucose monitoring is very important during the childhood and afterward. We may use OGTT as a monitoring tool on regular basis in every patient of celiac disease, so that early detection and proper management can be carried out.

REFERENCES

1. W Michael Bisser, Susan V Beath. Disorders of the alimentary tract and liver. Forfar & Arneils Textbook of Paediatrics 7th edition P 615–618.
2. Ghawil M, Miotti V, Tonutti E et al. HLA-DQ types of celiac disease in Libyan children with type 1 diabetes mellitus. *Eur J Gastroenterol Hepatol* 2012; 24(1):59-63. doi: 10.1097/MEG.
3. Bao F, Yu L, Babu S. One third of HLA DQ2 homozygous patients with type 1 diabetes express celiac disease-associated transglutaminase autoantibodies. *J Autoimmun* 1999; 13(1):143-8.
4. Keith Quirolo, Elliott Vichinsky. *Thalassemia Syndrome*. Nelson text book of paediatrics 19th Edition P: 1360 – 1364.
5. Joseph A Murray. The widening spectrum of celiac disease. *Am J Clin Nutr* 1999; 69:354–365.
6. Annie A. Pulikkal, Anish Kolly, Prasanna Kumar. The seroprevalence of immunoglobulin A transglutaminase in type 1 diabetic patients of South Indian origin” *Indian J Endocrinol Metab* 2016; 20(2): 233–237.
7. Al-Hakami A.M. Pattern of thyroid, celiac, and anti-cyclic citrullinated peptide autoantibodies coexistence with type 1 diabetes mellitus in patients from Southwestern Saudi Arabia. *Saudi Med J* 2016; 37(4):386-91.
8. Saadah OI, Al-Agha AE, Al Nahdi HM. Prevalence of celiac disease in children with type 1 diabetes mellitus screened by anti-tissue transglutaminase antibody from Western Saudi Arabia. *Saudi Med J* 2012; 33(5):541-6.
9. Gillett PM, Gillett HR, Israel DM. High prevalence of celiac disease in patients with type 1 diabetes detected by antibodies to endomysium and tissue transglutaminase. *Can J Gastroenterol* 2001 May; 15(5):297-301.
10. Banin P, Perretta R, Ravaioli E. Regression of autoimmunity and abnormal glucose homeostasis in an adolescent boy with silent celiac disease. *Acta Paediatr* 2002; 91(10):1141-3.
11. Camarca ME, Mozzillo E, Nugnes R. Celiac disease in type 1 diabetes mellitus. *Ital J Pediatr* Mar 2012, P: 86-88.
12. Pekka Collin, Katri Kaukinen, Matti Välimäki. *Endocrinological Disorders and Celiac Disease*. *Scand J Gastroenterol* 2011; 29:769–775.
13. R. Tortora, P. Capone, G. De Stefano. Metabolic Syndrome in Patients with Celiac Disease on a Gluten-free Diet. *Aliment Pharmacol Ther* 2015; 41(4):352-359.
14. Maria Erminia, Camarca, Enza Mozzillo. Celiac disease in type 1 diabetes mellitus. *Italian Journal of Pediatrics* March 2012; 38:10.
15. C Goh, K Banerjee. Prevalence of celiac disease in children and adolescents with type 1 diabetes mellitus in a clinic based population. *Postgrad Med J* 2007 Feb; 83(976): 132–136.
16. Mansour AA, Najeeb AA . Celiac disease in Iraqi type 1 diabetic patients. *Arab J Gastroenterol* 2011 Jun; 12(2):103-5.
17. Franco Cerutti, Graziella Bruno. Younger Age at Onset and Sex Predict Celiac Disease in Children and Adolescents With Type 1 Diabetes. *Diabetes Care* 2004 Jun; 27(6): 1294-1298.
18. Larsson K, Carlsson A, Cederwall. Annual screening detects celiac disease in children with type 1 diabetes. *Pediatr Diabetes* 2008 Aug; 9(4 Pt 2):354-9.
19. Greco D, Pisciotta M, Gambina F. Celiac disease in subjects with type 1 diabetes mellitus: a prevalence study in western Sicily (Italy) *Endocrine* 2013; 43(1):108-11.