Type 1 Diabetes and Associated Autoimmune Diseases (Celiac, Autoimmune Thyroid, Vitiligo)

(Original Research Article)

[1]Rihab Othman Abdulrraziq, [1]Asma Abdulazyz, [1]Nesrin Mousa Alsaber

[1]Faculty of medical, pediatric department, Tobruk university.

Corresponding Author: Dr Rihab Othman abdulrraziq,

Email: rehabomer82@Yahoo.com

Received 14th Jan 2023; Accepted 25th May 2023; published 29th Jun 2023

Abstract

Diabetes mellitus is a common autoimmune endocrine disorder associated with organ-specific autoantibodies which are frequently detected at the time of diagnosis. Individuals with type 1 diabetes have increased prevalence of other autoimmune diseases including autoimmune thyroid disease, celiac disease, and primary adrenal failure. In some patients, a shared genetic susceptibility for these diseases has been demonstrated. To define the prevalence of autoimmune disease in Libyan patients with type 1 diabetes mellitus (T1DM). Blood samples were collected from 99 patients with T1DM who are followed by Tobruk Diabetic Center, Libya. The patients were composed of 45 females (45.4%) and 54 males (54.5 %), of the diabetic children 10 patients about 10.1% were positive for celiac disease(female 6 %and 4male %) confirm with ant tissue -transglutaminase (TTG) , patient with diabetes had significant higher incidence of celiac diseases, also In this study we found 4 patients have autoimmune thyroid disease about(4%) belonged to female sex ,vitiligo 2patients female predominance. From previous result we concluded that the prevalence of autoimmune thyroid diseases, celiac diseases, vitiligo is high in (T1DM) especially among female patients.

Keywords: Celiac diseases - Autoimmune Thyroid Diseases; Type 1 Diabetes.

Introduction

Autoimmune diseases (ADs) comprise a range of chronic diseases in which the immune response to self-antigens results in damage or dysfunction of the target organs. As the pathogenesis of various ADs share common genetic factors and immunologic processes, these diseases often coexist within the same individual and families (1). Among the over 80 different ADs, celiac disease and hypothyroidism are the most frequently observed additional ADs in type 1 diabetes (T1D), followed by gastric autoimmunity (including pernicious anemia), vitiligo, hyperthyroidism, autoimmune adrenalitis, gonadal insufficiency, autoimmune hepatitis, dermatomyositis, and myasthenia gravis (2,3). In general, female sex, older age, and longer duration of diabetes confer a greater risk of multiple ADs (4). There is also genetic overlap between T1D and other ADs outside the HLA region (5). Clustering of ADs in the same individuals and in the same families, however, indicates that shared environmental or other pathophysiological mechanisms cannot be ruled out (6).

Autoimmune thyroiditis

Autoimmune thyroid disease is the condition most commonly associated with Type 1 diabetes, but it is also the least serious and the easiest to treat. It is important to make a clear distinction between hypothyroidism (an under-active thyroid), which is much more common, and hyperthyroidism (an over-active thyroid).

Autoimmune thyroiditis is found in 13 to 23% of people with Type 1 diabetes, and the risk increases with age. According to studies, almost 40% of women may test positive for autoantibodies (used for diagnosis).

Celiac disease

Celiac disease is an autoimmune inflammatory disease of the gut, directly triggered by gluten. A person with Type 1 diabetes is three times more likely to have celiac disease[1]. Again, the condition is diagnosed by testing for specific autoantibodies. The classic symptoms include bloating, abdominal pain, diarrhea or constipation, fatigue or anemia.

Vitiligo

In vitiligo, the melanocytes that give the skin its pigment are weakened as a result of autoimmune inflammation, causing discoloration of the skin.

The present study was carried out to give background on autoimmune diseases (Type 1 diabetes, Autoimmune thyroid disease, Celiac disease, Vitiligo).to study effect of these autoimmune diseases on diabetes control and to determine prevalence of these autoimmune diseases among Libyan patient with diabetic in Tobruk city.

Materials and methods

Blood samples were collected from 99 patients with T1DM who are followed by Tobruk Diabetic Center, Libya. The patients were composed of 45 females (45.4%) and 54 males (54.5 %), mean age 10 ± 5years, mean duration of diabetes 5.7 ± 5.0 years (range 0.1-15years). Patient investigated for celiac and autoimmune thyroiditis, Celiac disease has been diagnosed by finding positive anti- tissue transglutaminase (TTG) test and endomysial antibody (EMAAb) and Autoimmune thyroid disease diagnosed by anti-thyroperoxidase (TPO) and anti-thyroglobulin antibodies (TG). TSH and FT4 concentrations were measured in all subjects.

Ethical considerations

I hereby declare that the clinical research paper titled [Type 1 diabetes and associated autoimmune diseases (celiac, autoimmune thyroid, vitiligo)] has received ethical approval from institutional review board (Tobruk medical center ethic committee) prior to its commencement (Ethical approval number NBC:009.H.23.2) All patients diagnosed with type 1diabetes were informed about the research and gave their verbal consent.

Results

99 patients (54male -45 female) with type 1diabetes mellitus included in this study, with clinical evidence of classical manifestation diabetes mellitus, examination of these patients reveal that the incidence of autoimmune diseases was significantly increased with type 1 diabetes mellitus, compared with normal population. of the diabetic children 10 patients about 10.1% were positive for celiac disease confirm with TTG and endomysial antibody, as having celiac (6 female about 60%, male4

about 40%) ,(Figure 1) reveal that patient with diabetes had significant higher incidence of celiac diseases ,also in Figure2 celiac disease show female predominance, in this study also we found 4 patients of diabetes child have thyroid dysfunction about 4.0% with positive antithyroglobulin antibodies (TG-Ab),all patients female(100%) with hypothyroidism low FT4, this female predominance in the present study is also documented in different reports, We have 2 patients2% vitiligo diagnosis by clinical finding ,2 female patient.

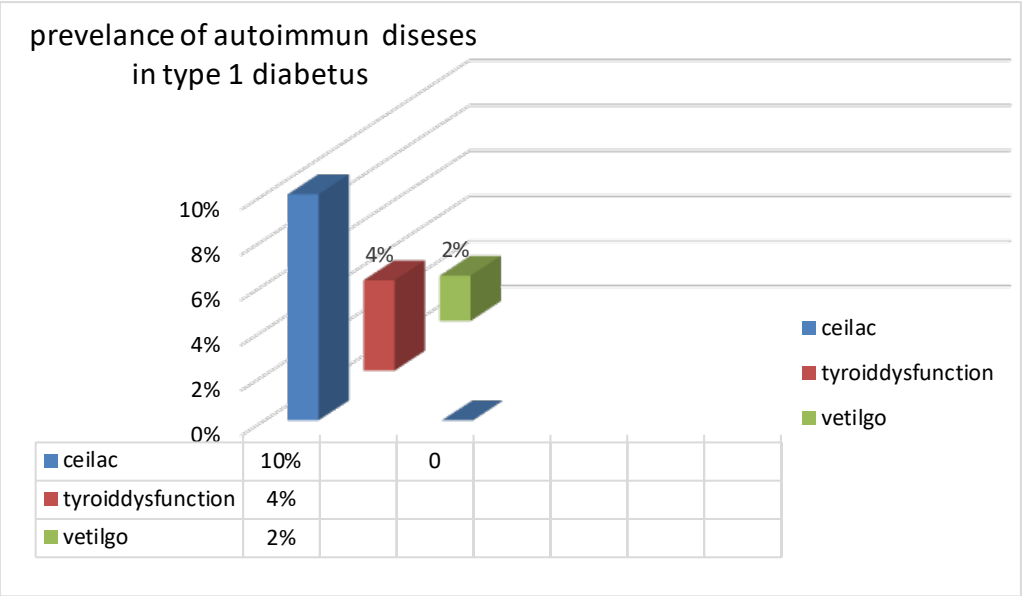

Figure 1: Prevalence of Autoimmune Disease in Type1Diabetus.

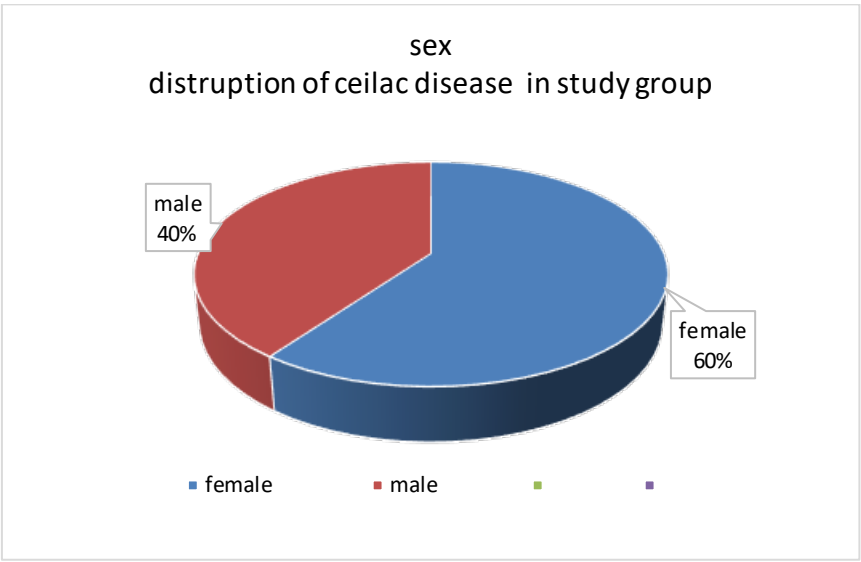

Figure 2: Sex Distribution of Celiac Diseases in Study Group.

Discussion

The aim of this study was to determine the prevalence of autoimmune disease among Libyan patients in TOBRUK city with type 1 diabetes mellitus. the prevalence of these autoimmune disease among patients with type 1 diabetes mellitus is conflicting at present. T1DM is associated with autoimmune thyroid diseases (A I T D), celiac disease, (CD), Addison disease AD, vitiligo, other autoimmune diseases.These diseases can occur together in defined syndrome with distinct pathophysiology and characteristic: autoimmune poly endocrine syndrome I and II (7)

Type 1 diabetes (T1D) is an organ-specific autoimmune disease caused by the autoimmune response against pancreatic β cells. T1D is often complicated with other autoimmune diseases, and anti-islet autoantibodies precede the clinical onset of disease. The most common coexisting organ-specific autoimmune disease in patients with T1D is autoimmune thyroid disease, and its frequency is estimated at > 90% among patients with T1D and autoimmune diseases. Furthermore, patients with anti-thyroid antibodies are 18 times more likely to develop thyroid disease than patients without anti-thyroid antibodies. Therefore, for early detection of autoimmune thyroid disease in children with T1D, measurement of anti-thyroid antibodies and TSH at T1D onset and in yearly intervals after the age of 12 yrs. is recommended. Autoimmune thyroid disease more common in female after the age of 12 years and increased with longer duration of diabetes (8). In our study on 90 patients in regular follow up in Tobruk diabetes center shows that patient with diabetes had significantly higher incidence of autoimmune hypothyroidism (4%) which were more than occurs in normal people.

This is in agreement with Jayaraman et al (9), in study included214patient with type 1diabtes observed 6% patient have hypothyroidism. Several report inconsistent results in contrast with what has been found in this study. Umpierrez et al (10) he found 33% of patient have thyroid dysfunction, more common in female than male. Also, prospective study on 489 patients in Tripoli medical center 28.7% of cases have thyroid dysfunctions more common in the female.

In our study we found10 patients (10%) with celiac diseases, 6 female (about 60%)average age (3-5years) and 4males (40%) average age(7-10 years), have been diagnosed by finding positive anti tissue transglutaminase (TTG)test .The prevalence

of celiac disease with patient of type 1 diabetes is approximately 20 times higher than normal population(11),patients wit out celiac disease were significantly younger at diabetes onset (12). In agreement with our study Ashabani et al(13) investigated 234 Libyan children with T1DM for CD. the prevalence of celiac disease in this study was thus 10.3%. The prevalence of CD in patient of type1 diabetes mellitus in Libya was found higher than in several European countries.

Conclusion

The prevalence of autoimmune disease (thyroid -celiac-vitiligo) in type 1 diabetic patients is higher than in the general population. The high prevalence of these diseases may be explained by shared genetic susceptibility ,the genetic risk for these diseases overlaps and includes the genes within major of histocompatibility complex (MHC) ,for these reason A routine screening strategy should be implemented with the determination of anti-thyroid antibodies and TSH ,TTG antibodies in type 1 diabetic patients, particularly in girls, and in patients with diabetes of more than 5 years duration.

References

1. Menconi F, Osman R, Monti MC, Greenberg DA, Concepcion ES, Tomer Y. Shared molecular amino acid signature in the HLA-DR peptide binding pocket predisposes to both autoimmune diabetes and thyroiditis. Proc Natl Acad Sci U S A 2010;107:16899–16903.
2. Nederstigt C, Uitbeijerse BS, Janssen LGM, Corssmit EPM, de Koning EJP, Dekkers OM. Associated auto-immune disease in type 1 diabetes patients: a systematic review and meta-analysis. Eur J Endocrinol 2019;180:135–144
3. Snajderová M, Martínek J, Horejsí J, Nováková D, Lebl J, Kolousková S. Premenarchal and postmenarchal girls with insulin-dependent diabetes mellitus: ovarian and other organ-specific autoantibodies, menstrual cycle. J Pediatr Adolesc Gynecol 1999;12:209–214
4. Barker JM, Yu J, Yu L, et al. Autoantibody "subspecificity" in type 1 diabetes: risk for organ-specific autoimmunity clusters in distinct groups. Diabetes Care 2005;28:850–855
5. Roizen JD, Bradfield JP, Hakonarson H. Progress in understanding type 1 diabetes through its genetic overlap with other autoimmune diseases. Curr Diab

Rep 2015;15:1026.Hagopian W, Lee HS, Liu E, et al.; TEDDY Study Group. Co-occurrence of type 1 diabetes and celiac disease autoimmunity. Pediatrics 2017;140:e20171305

6. Barker MJ. type 1 diabetes associated autoimmunity : natural history ,genetic association and screening .journal clinical endocrinology and metabolism 2006;91(4):1210-17.
7. Muthukrishnan J ,Kiranmayi L, Verma A and Modi KD, Type 1 diabetes mellitus: correlation between etiological factors and associated condition .international journal of Diabetes in Developing countries 2007;27(2):46-9.
8. Gowswami R, Marwaha RK, Goswami D,Gupta N,Ray D,Tomar N et al .prevalence of Thyroid Autoimmunity in sporadic idiopathic hypoparathyroidism in comparison to type 1 diabetes and premature ovarian failure. Journal clinical Endocrinology and metabolism 2006;91(11):4256-9.
9. Umpierrez GE , Latif KA, Murphy MB ,Lambeth HC,Stentz F ,Bush AL .Thyroid dysfunction in patient with type I diabetes care2003 ;26:1181-5.
10. Barera G, Bonfanti R, Viscardi M , Bazzigaluppi E ,Calori G, Meschi F et al . Occurance of ceiac Diseases after onset of type 1 Diabetes: A 6-Year prospective Longitudinal study. Pediatrics 2002 ; 109(5) : 833-8 .
11. Hansen D , Brock-jacobesen B ,Lund E , Bjorn C , Hansen LP ,Nielsen C et al. clinic benefit of gluten free diet in type 1 diabetic children with screening detected celiac diseases :a population -based screening study with 2 years follow - up. Diabetic care 2006;29(11):2552-6.
12. A Shabani A , Abushofa U , Abusrewill S , Abdulazez M , Tuckova L , Tlaskalova-Hogenova H . The prevalence of celiac diseases n Libyan children withtype1 diabetes mellitus .Diabetic/metabolism Research and Review 2003; 19(1):69-75.
13. International Diabetes Federation. IDF Diabetes Atlas teB, Belgium: International Diabetes Federation, 2013. Available from: http://www.idf.org/diabetesatlas .
14. Tuomilehto J. The emerging global epidemic of type 1 diabetes. Curr Diab Rep. 2013;13:795–804. - PubMed.