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Original Research Paper

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COMBINED SICKLE CELL DISEASE AND DIABETES MELLITUS TYPE ONE - FIRST REPORTED CASE IN KSA.

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ABSTRACT

Background; Diabetes mellitus type one accounts for the two third of diabetes Mellitus in young population [1]. On the other hand, Sickle cell disease is a genetic disease with different haplotypes and geographic distributions [2]. Combination between diabetes mellitus type one and sickle cell disease is uncommon worldwide. For this rare combination this case is reported.

Case report: This is a 16 years old dark skin female, a known case of sickle cell disease with frequent admissions to the hospital as a simple vaso-occlusive crisis in a form of generalized body ache. She was kept on oral folic acid 5mg once daily and analgesia in form of oral NSAID (non-steroidal anti-inflammatory drugs) and paracetamol at home. She has no previous surgery, no frequent transfusion and no iron overload. She had a single attack of acute chest syndrome which required exchange transfusion and since then she was kept on Hydroxyurea (She is taking 1 gm per day). Patient found to have multiple readings of high blood sugar for almost six months. Diagnosed as type 1 Diabetes mellitus at age of 14 years old based on Anti-GAD (Glutamic Acid Decarboxylase) antibodies. Started on insulin, basal and premeal. never presented with ketoacidosis although she presented several times with dehydration, upper respiratory tract infection, gastroenteritis and many times missing doses of insulin. She has family history of type 2 Diabetes mellitus in her father and his family.

We are questioning if having the sickle gene will protect her from ketoacidosis although she presented several times with clear precipitating factor for ketoacidosis.

Conclusion; In conclusion, both sickle cell disease and Diabetes Mellitus type one are well known among the young age population. The combination between the two diseases is not reported widely.

Whether the presence of Sickle cell disease really protects from diabetes mellitus, generally, and diabetic ketoacidosis, specially, is an area requires further study.

KEYWORDS : Sickle cell disease, crisis, ketoacidosis, diabetes type one.

INTRODUCTION:

Sickle cell disease is an autosomal recessive disorder. Whereas, diabetes mellitus type one is an autoimmune condition with variant triggers such as; viral infection, genetic and familial factors. the incidence of combined two conditions is very rare. Although there are only few reported cases previously, still no enough cases studied to explain the coexistence of both conditions. And whether the combined presentation may protect from diabetic complications such as ketoacidosis, especially in black population? No similar case has been reported from Saudi Arabia up to date. This case report presents a patient of sickle cell disease with Type 1 diabetes mellitus that has never got ketoacidosis in presence of precipitating factors and missing insulin doses some times.

Case report

This is a16 years old black female, known case of sickle cell disease. The family gave history of frequent painful crises, mainly in both extremities and back. She is taking oral folic acid and analgesia with NSAID and paracetamol at home. She has no previous surgery, no frequent transfusion and no iron overload. she had a single attack of acute chest syndrome which required exchange transfusion and since then she was kept on Hydroxyurea (She is taking 1 gm per day). Diagnosed to have diabetes mellitus type one when she was 14 years old after a history of incidental finding of high random and fasting blood glucose readings for 6 months. Evaluated by endocrine team and work up revealed a positive ANTI GAD antibody. Kept on long acting Insulin Glargine every night and short acting Insulin pre meals. She has never presented with ketoacidosis although she presented several times with dehydration, upper respiratory tract infection, gastroenteritis and many times missing doses of insulin. She has no proteinuria or retinopathy. she has positive family history of diabetes mellitus type 2 in her father.

On examination, the patient is black average body built with BMI of 19 kg/m2, pale and jaundiced with vital signs of average BP 110/60 mmhg, Pulse 98 beats/min, Respiratory rate 20 breaths/min, O2 Saturation 100% on room air. Has insignificant respiratory and cardiovascular systems finding on examination. Abdominal examination showed no organomegaly. No finding suggestive of retinopathy or neuropathy.

Investigations: hemoglobin baseline 8-9 g/dl, leukocyte count 10 ($10^{\wedge 3}$ /θL) with normal differential count, random blood glucose 20 mmol/l (poorly controlled). Her baseline hemoglobin electrophoresis: hemoglobin S around 75%, hemoglobin F: 9% and hemoglobin A2: 3.6%, Normal liver panel , normal iron profile with ferritin of 186 ng/ml , positive Anti-GAD antibodies , and negative islet cell antibodies, she has creatinine of 88 mol/L , Blood Urea Nitrogen (BUN) of 6.5 mol/L and no proteinuria.

DISCUSSION;

Diabetes mellitus type one accounts for more than 80% of diabetes Mellitus in the young population [1]. Sickle cell disease accounts for 1.4% of all Saudi population with different geographic distribution and different haplotypes [2].

Combination between diabetes mellitus type one and sickle cell disease is uncommon worldwide. There are rare reported cases about such combination and no study showed the correlation of the co-existence of the two conditions [3]. In fact, having hemoglobinopathy does not increase the risk for developing diabetes and the reported cases were incidentally found for unclear correlation with ethnicity or geographic area [4]. Shoar Z et al reported one adolescent case with sickle cell disease and diabetes mellitus type one by clinical and laboratory criteria as well as positive autoantibody [3]. Adekile AD et al reported another case with the same combination but in presence of positive family history of diabetes Mellitus type 1 and he considers looking after pancreatic function in familial cases [11]. This is different than what happens in our case which has no family history of diabetes Mellitus type 1. MK Mohapatra et al , reported a single case report of sickle cell disease with diabetes mellitus type one in Burla, India that presented with ketoacidosis[5] , on the other hand two other reported cases in Nigeria for pediatric age group with same unique combination but never went to ketoacidosis [6,7,10]. In our case, over two years of follow up, there was no single admission with ketoacidosis and this keeps us questioning that being sickle cell disease patient will get protection from ketoacidosis? And in which mechanism such protection will occur? And does black or African ethnicity play a role in ketoacidosis protection with sickle cell disease, which was also seen in the previous two cases reported from Nigeria as well as our case whose clinical picture behaves like African haplotype sub group of sickle cell disease patients.

The prevalence of DM type 2 among sickle cell disease patients in Bahraini Sickle cell population was 8.3% and it was interpreted as lower than expected among non-sickle population [8]. The author raises the question of protection of sickle cell disease from developing diabetes. No study highlights diabetes mellitus type one with sickle cell disease as it is very rare and no one investigated the protection from ketoacidosis if there is any.

Hemoglobin A1C test is recommended to monitor cumulative blood glucose level for diabetic patients over the past 2 to 3 months. It is a very important marker with regard to risk, particularly for microvascular complications in diabetes. Yet , this test has some limitations specially in monitoring diabetic patients with sickle cell disease because of frequent hemolysis and shortened life span of red blood cells in comparison to patients without sickle cell disease [4]. Some data showed that the hemoglobin A1C test can be used in sickle cell trait but not in homozygous SS disease (as they do not have any hemoglobin A to be glycosylated except after blood transfusion). Taking this reality in consideration we did not monitor A1C level in our case scenario. Fructosamine assay was found to be superior to HgA1c for monitoring glycemic control in patients with sickle cell disease [9]. For unavailability of fructosamine test in our center, this level was not monitored. Furthermore, the use of real time blood glucose monitoring and new technologies might offer some solutions to these challenging patients.

In conclusion, both sickle cell disease and diabetes mellitus type one are common among the young age population. The combination between the two diseases is not reported widely. This is the first case report for such combination in Saudi Arabia and the real prevalence in Saudi Arabia with this combined disease is unknown. For that, Screening of young Sickle cell disease patients for diabetes mellitus shall be taken in consideration specially the patient might not get ketoacidosis. Hemoglobin A1c is not suitable for monitoring for cumulative blood glucose in Sickle cell disease. Fructosamine assay of other glycosylated plasma proteins as well as continuous or real time glucose check might be a solution. Whether the presence of Sickle cell disease really protects from diabetes mellitus generally and diabetic ketoacidosis specially is an area requiring further study.

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None to declare

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