Glucose intolerance due to pancreatic hemosiderosis in thalassemic children

Nilesh Shewale, Prashant Patil

Department of Paediatric, Govt. Medical Collage and Hospital, Aurangabad (M.S.), India

Iron overload is commonly seen in thalassemia major patients because of regular blood transfusions without iron chelation therapy (as is case in developing countries). Marked iron deposition has been found in liver, pancreas, thyroid, parathyroid, adrenal zona glomerulosa, renal medulla, heart, bone marrow and spleen which causes multiorgan dysfunction. The association of chronic iron overload with impaired glucose tolerance and diabetes is well recognized in thalassemics. Impaired glucose tolerance precedes few months to five years before development of diabetes. We report glucose intolerance in thalassemia major children <12 years old receiving blood transfusions without iron chelation.

KEY WORDS: Glucose tolerance test, iron chelation, iron over load, Thalassemia major

Introduction

'Cure' of thalassemia major is available with bone marrow transplantation. Because of lack of awareness and affordability, regular blood transfusion remains mainstay of treatment for thalassemic children. Most of them are regularly transfused without iron chelation leading to iron overload. On ultrasonography, with marked iron deposition in pancreas increased echogenecity and decreased size of gland has been found which correlated with patient age and duration of therapy.[1]

With pancreatic iron deposition glucose intolerance followed by diabetes mellitus is seen. We describe glucose intolerance in such thalassemic children <12 years of age on regular blood transfusion, which developed earlier due to lack of iron chelation.

Correspondence to **Dr. N.S. Shewale**, Department of Paediatric, Dr. V.M. Govt. Medical College, Civil Hospital, Solapur, (M.S.), India.
E-mail: nilesh6678@rediffmail.com

Case Report

Oral glucose tolerance test (OGTT) was performed on 40 diagnosed cases of thalassemia major below 12 years of age who have received at least 30 units of blood transfusion. Patients with any acute illness and those with diabetes mellitus (diagnosed earlier) were excluded from study. Results of oral glucose tolerance test were interpreted on basis of guidelines of 'WHO' diagnosis and classification of diabetes mellitus.[2] Subjects and patients were informed to take normal diet three days prior to test and to be fasting for 12 hours prior to test. IV line was established and sample for fasting blood glucose was collected. Oral glucose was given in dose of 1.75 gm / kg. (max. 75 gm) over 5 minutes.

Blood samples were collected at 1/2, 1, 1.5, and 2 hours after glucose was given. Blood glucose estimation was done by glucose oxidase peroxidase method (GOD-POD method). Impaired glucose tolerance was defined as 2 hours blood glucose between 140 and 199 mg% and diabetes mellitus was defined as fasting blood glucose >126 mg% and 2 hours blood glucose during OGTT >200 mg%.[2]

No patient was on iron chelation therapy. Glucose tolerance was impaired in 4 cases (10%). Two cases with impaired glucose tolerance were of 11 years age while two cases were of 12 years, so mean age of patient with impaired glucose tolerance was 11.5 year. All four cases with impaired glucose tolerance have received more than 100 units of blood transfusion.

Discussion

With regular blood transfusion in thalassemia major

patients (to keep Hb around 10 gm%) quality of life has improved and survival has prolonged. Frequent blood transfusions leads to iron overload and because of cost and duration of iron chelation therapy very few patients (desferrioxamine is available to <10% patients worldwide and <3% in India) can afford it.[3] Thus, in thalassemics iron overload become major problem which leads to multiorgan dysfunction. Pancreatic hemosiderin deposition and resultant damages to β cells leads to impaired glucose tolerance and diabetes.[4]

We observed impaired glucose tolerance in 4 cases (10%) all of them have received more than 100 units of blood transfusion. This indicates that, with increase in iron overload pancreatic damage increases resulting in impaired glucose tolerance initially and then diabetes mellitus. Compared with 3% incidence observed by Flynn *et al*.[5] with mean age of 11.7 years we observed high incidence (10%), which may be because of lack of iron chelation received. In other study,[6] incidence of impaired glucose tolerance observed was 3.5% and 20% for pre-pubertal and post-pubertal children, respectively.

Family history of diabetes mellitus may predispose to glucose intolerance in multiple transfused patients.[7] We could not comment about such relation of family history and glucose intolerance as none of our patients had family history of diabetes mellitus.

Chern *et al*. observed impaired glucose tolerance in 8.5% patients with mean age group of 16.6 ± 4.9 years. Compared with present study, impaired tolerance was observed in later age and incidence was also less, which may be because of iron chelation received by cases in above study.[8]

To conclude, all patients with impaired glucose tolerance in present study had received more than 100 units of blood transfusions with mean age of 11.5 years indicating that abnormal glucose homeostasis begins in second decade of life as pancreatic iron deposition increases leading to its damage. Thus, glucose intolerance in thalassemics is seen at an early age because of lack of iron chelation in developing countries. They should undergo OGTT in second decade of life as impaired glucose tolerance precedes few months to 5 years before development of diabetes mellitus.[9]

Acknowledgement

The authors are thankful to Department of Biochemistry Govt. Medical College and Hospital, Aurangabad for blood sugar estimation.

References

1. Gullo L, Corcioni E, Brancati C, Bria M, Pezzilli R, Sprovieri G. Morphologic and functional evaluation of the exocrine pancreas in beta thalassemia major. Pancreas 1993;8:176-80.
2. Alberti KGGM, Zimmet PZ. Definition, diagnosis, classification of diabetes mellitus and its complications. Report of WHO consultation. World Health Organization: Geneva; 1999.
3. Shah D, Choudhary P, Dubey AP. Current trends in management of beta thalassemias. Indian Pediatr 1999;36:1229-42.
4. Al-Hazmi MAF, Al-Swailem A, Al-Fawaz I, Waresy A, Al-Swailem A. Diabetes mellitus in children suffering from beta thalassemia. J Trop Pediatr 1994;40:261-6.
5. Flynn D, Fairney A, Jackson D, Clayton BE. Hormonal changes in thalassemia major. Arch Dis Child 1976;51:826-36.
6. Gulati R, Bhatia V, Agarwal S. Early onset of endocrine abnormalities in beta thalassemia major in developing country. J Pediatr Endocrinol Metab 2000;13:651-6.
7. Saudek CD, Robert M, Peterson CM. Abnormal glucose tolerance in beta thalassemia major. Metabolism 1977;26:43-51.
8. Chern JP, Lin KH, Lu MY, Lin DT, Lin KS, Chen JD, *et al*. Abnormal glucose tolerance in transfusion-dependent beta-thalassemic patients. Diabetes Care 2001;24:850-4.
9. Sanctiz VD, Zurlo MG, Senesi E, Boffa C, Cavaallo L, Di Gregorio F. Insulin dependant diabetes in thalassemia. Arch Dis Child 1988;63:58-62.

Source of Support: Nil, **Conflict of Interest:** None declared.