ORIGINAL ARTICLE

Study of IGT in Children of β-thalassemia Major: Experience at Sahiwal Medical College

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ABSTRACT

Aim: To determine the frequency of impaired glucose tolerance in children with beta thalassemia major on regular blood transfusion.
Methods: This study was conducted at Department of Pediatrics, Sahiwal Medial College, Sahiwal from July 2015 to June 2016. Total 161 children having age from 3 years to 20 years with thalassemia major were selected for this study.
Results: Total, 86(53.42%) patients were between 3-10 years and 75(46.58%) were between 11-20 years, with mean age 10.55±4.90 years, 97(60.25%) were male and 64(39.75%) were females and frequency of impaired glucose tolerance reveals in 17(10.56%) patients.
Conclusion: We concluded that the frequency of impaired glucose tolerance in children with thalassemia major on regular blood transfusion is higher, however, some other studies are required to authenticate our findings.
Keywords: Children, Thalassemia major, blood transfusion, impaired glucose tolerance, frequency

INTRODUCTION

The thalassemias are autosomal recessive conditions which affecting quantity of hemoglobin molecules within the red blood cells. Beta thalassemia arises out of the mutations in ß globin genes on chromosome 11[1]. The β-thalassemia is very common in Pakistan, India, Mediterranean region and middle east.[2]About 1.5 percent of world population is carrier[3].

In Greece its carrier rate is 6% to 19%, in Cyprus 15% to 17%, Iran 4% to 5%, in Saudi Arabia 1% to 2% and in Pakistan 1% to 8%[4,5,6].

Children with thalassemia major need regular lifelong red blood cell (RBC) transfusions for their survival. By these patients, most of the problems encountered are actually the complications of the transfusion rather than disease complication itself and iron over load is one of them. Iron overload may lead to development of endocrine complications especially impaired glucose tolerance.[1] The frequency of impaired glucose tolerance (IGT) varies from 7.1-28.04% in children with thalassemia on regular blood transfusion[7,8,9].

Thalassemia is very common in this area and thalassemia center is established at Sahiwal Medial College, Sahiwal to manage such patients. There is no study conducted before in this area or any other part of Pakistan to know the frequency of IGT in these children. The objective of our study is to know the frequency of IGT in children with thalassemia major so that we can have future plan to prevent and manage this serious complication.

MATERIAL AND METHODS

This was a cross sectional study conducted at Department of Pediatrics, Sahiwal Medial College, SahiwalfromJuly 2015 to June 2016.Total 161 children older than 3 years and less than 20 years having thalassemia major and receiving more than 5 blood transfusions (75ml packed cells /kg) per year as an average and minimum 20 blood transfusions were recruited for this study. Children with hemolytic anemias other than beta thalassemia major were excluded from the study.

Thalassemia major: children having severe microcytic hypochromic anemia (Hb< 5gm%) with reduced adult hemoglobin and fetal hemoglobin greater than 50% of total hemoglobin at the time of diagnosis. An approval was taken from institutional review committee and written informed consent was taken from attendant of every child.

The oral glucose tolerance test (OGTT) was performed in morning after an overnight fast and at least 2 weeks after the last transfusion. The dosage of glucose for OGTT was 1.75g/kg up to the maximum 75g dissolved in 250ml of water. Blood samples were obtained at 0 and 120 minutes post glucose administration and send to laboratory for plasma glucose, serum ferritin and hepatitis B and C investigations. Impaired glucose tolerance: fasting plasma glucose <126mg/dl while 2–h plasma glucose

≥140mg/dl but < 200mg/dl. All the findings with demographic profile of the patients was entered in pre-designed proforma.

The collected data was analyzed by using SPSS version16. The frequency and percentage of impaired glucose tolerance was calculated. Stratification was performed to control effect modifier like age, gender, number of blood transfusion, serum ferritin level and hepatitis B and C status. The mean±sd was calculated for age of the patients, number of transfusions, height and weight.

RESULTS

Total 161 cases fulfilling the inclusion/exclusion criteria were enrolled. Mean age of children was 10.55±4.90 and mean weight & height was calculated which shows 41.5±10.78kg and mean height was calculated as 132.8±16.34cm.

Frequency of impaired glucose tolerance reveals in 17(10.56%) while 144(89.44%) had no findings of the morbidity (Table 1).

Stratification for frequency of impaired glucose tolerance in relation to age was done.Out of 17 cases of impaired glucose tolerance 11(64.71%) were between 3-10 years and 6(35.29%) were between 11-20 years (Table 2).

Stratification for frequency of impaired glucose tolerance in relation to gender was done. Out of 17 cases of impaired glucose tolerance 7(41.18%) children were male and 10(58.82%) children were females (Table 3).

Stratification for frequency of impaired glucose tolerance with regards to Hepatitis B&C was recorded which shows that out of 17 cases of impaired glucose tolerance 3(17.65%had Hepatitis B, 1(5.88%) had Hepatitis C while 13(76.47%) had no hepatitis (Table 4).

Table 1: Frequency of impaired glucose tolerance (n=161)

Impaired Glucose Tolerance	n	%age
Yes	17	10.56
No	144	89.44
Total	161	100

Table 2: Stratification for age (n=17)

Age(in years)	n	%age
3-10	11	64.71
11-20	6	35.29
Total	17	100

Table 3: Stratification for gender (n=17)

Gender	n	%age
Male	7	41.18
Female	10	58.82
Total	17	100

Table 4: Stratification for hepatitis B & C (n=17)

Hepatitis	n	%age
B	3	17.65
C	1	5.88
No hepatitis	13	76.47
Total	17	100

DISCUSSION

β-thalassemia major is a pack red cell transfusion-dependent condition requiring lifelong blood transfusions for afflicted patients to stay alive. Patients suffering from this disease faces many problems if the transfusion is inadequate, but at same time repeated blood transfusions are associated with hazards. One of the most frequent endocrine complication in thalassemia major patients is diabetic so that 25-50% these patient have IGT test or diabetes[10,11].

In our study, 86(53.42%) were between 3-10 years and 75(46.58%) were between 11-20 years, mean±sd was calculated 10.55±4.90 years, 97(60.25%) were male and 64(39.75%) were females and frequency of IGT reveals in 17(10.56%) while 144(89.44%) had no findings of the morbidity. One study documented the frequency of IGT as 7.1% in children with thalassemiachildren on regular blood transfusion[7]. These findings are in favor of our study.

Another study by Chern JP et al[9] reported the frequency of IGT as 8.5% which is also in agreement with our study.

Khalifa AS and others[12] concluded that abnormal glucose tolerance is very common in b thalassemic children receiving multiple blood transfusion children, which could be contributory factor to progressive and early loss of beta-cell mass, along with persistent insulin resistance. Viral infection like chronic hepatitis C may play a role inprogression of abnormal glucose tolerance.

Jaruratanasirikul S and co-workers[13] in a study concluded that the frequency of IGT in thalassemic children receiving hypertransfusions with suboptimal iron chelating therapy was 12.5%. The clinical characteristics of children with thalassemia who developed IGT were stunting, wasting, higher ferritin levels and lower AUC insulin.

The mechanism of abnormal glucose homeostasis with β-thalassemia major is still not clear but is attributed mainly to insulin deficiency because of iron deposition in pancreas[14-16] and secondly from insulin resistance[17]due to iron deposition in both liver and muscle. Glucose intolerance and overt diabetes[18]may be the final result ofpersistent insulin resistance along with a progressive decrease level of circulating insulin.

CONCLUSION

We concluded that the frequency of impaired glucose tolerance in children with thalassemia major on regular blood transfusion is higher, however, some other studies are required to authenticate our findings.

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