ORIGINAL ARTCLE

Hypothyroidism in Children Suffering from Beta Thalasemia Major

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ABSTRACT

Aim: To determine the frequency of hypothyroidism in children suffering from beta thalasemia major.
Methods: A total of 75 diagnosed cases of beta thalasemia major of age between 5 to 15 years of either gender were enrolled from paediatric ward Allied hospital, Ali Zaib foundation and Sundus foundation, Faisalabad during the year 2016. Blood sample of 2ml was taken from children for TSH and T4 and was sent to pathology Lab Allied Hospital Faisalabad. Levels of TSH and T4 were estimated by Elisa kit. Data was statistically analyzed to determine the frequency and percentage of Hypothyroidism.
Results: Mean age of hypothyroid patients was 10.48±2.6 years. Out of these 14(28.6%) were male and 8 (30.8%) were female. Hypothyroidism was seen in 22(29.3%) patients.
Conclusion: Hypothyroidism can occur in thalasemia major patients in the absence of particular clinical signs. Screening of thalasemic patients for hypothyroidism is very important for early diagnosis and timely treatment of affected children to improve quality of life.
Keywords: Beta thalasemia, Hypothyroidism, Anemia, Haemoglobin, TSH, T4.

INTRODUCTION

Beta thalasemia includes a group of autosomal recessive haemoglobin disorders characterized by deficient production of a beta globin chain.[1] The homozygous state become symptomatic in the form of severe anemia in the last six months of first year of life, and requires regular blood transfusions[2].

Thalasemia is most common mongenic disorder in the world, especially in people of Mediterranean, Indian subcontinent and Middle East origin; approx 9000 children of beta thalasemia are born per year; although no documentary data is available in Pakistan. The estimated carrier rate is 5-7% with 9.8 million carriers in the total population[3].

Treatment options include regular blood transfusions and stem cell transplantation. Repeated blood transfusions result in excessive accumulation of iron in different body organs which results in early death. Use of iron chelators have improved the survival rate but frequency of endocrine complications including cardiomayopathy, hypothyroidism, hypogonadism, diabetes mellitus and hypoparathyroidism have increased in long term servivors[4,5].

Primary, sub-clinical and central type of hypothyroidism has been reported in thalasemia major patients[3,5,6,7] sub-clinical type being the most common.1,6,8 Patients with hypothyroidism have lethargy, poor school performance, constipation, cold intolerance and weight gain.

Depending upon region, quality of management and treatment protocols there is variation in frequency of hypothyroidism in thalasemia major patients ranging from 7-78%[1,2,6].

A local study was conducted at department of Hematology, The Children's Hospital, Lahore on 70 patients of thalasemia major in which 25.7% patients were diagnosed to have hypothyroidism.[1]

Rationale of study is to determine the frequency of hypothyroidism in thalasemia major patients as there is considerable variation in the results of previous studies. Moreover results of this study may emphasize the importance of screening of thalasemic patients for this important endocrine problem, so that the affected children be diagnosed earlier. Thus timely treatment may improve quality of life of such patients.

MATERIAL AND METHODS

A total of 75 diagnosed cases of beta thalasemia cases between 5-15 years of either gender were included in the study and those with thalasemia intermedia and minor, patients with acute illness and having a family history of hypothyroidism were excluded. The study was conducted at Allied Hospital, Faisalabad, Ali Zaib foundation and Sundas foundation, Faisalabad. A blood sample of 2cc was taken from children for TSH and T4 and sent to pathology department of Allied hospital, Faisalabad. Level of TSH and T4 was estimated by immunotech

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kit and Gama counter analyser and was reported by the pathologist.

RESULTS

Out of 75 thalasemic major children 49 (65.3%) were male and 26 (34.7%) were female (Table 1). Their age was between 5 to 15 year and they were divided into two groups, group A had children of 5-10 years (46.7%) and group B had children of 11-15 years (53.3%) (Table 2). Mean TSH level was 4.4400±1.73 and mean T4 level was 9.2267±1.46 (table 3). Primary hypothyroidism was found in 22 (29.3%) patients (table 4).

Table 1: Gender distribution (n=75)

Gender	Frequency	%age
Male	49	65.3
Female	26	34.7
Total	75	100

Table 2: Age distribution (n=75)

Age	Frequency	%age
5-10 years	35	46.7
11-15	40	53.3
Total	75	100

Table 3: Mean TSH and T4 levels (n=75)

TSH/T4	Mean	SD
TSH	4.44	1.73
T4	9.22	1.46

Table 4: Frequency of hypothyroidism

Hypothyroidism	Frequency	%age
Yes	22	29.3
No	53	70.7
Total	75	100

DISCUSSION

For several decades, hyper transfusion has improved the expectancy of life in thalasemia major patients. On the other hand chelation therapy is expensive, difficult to administer and is not as easily available therefore the compliance is often poor despite regular transfusions, causing iron overload[9].

One important aspect in the management of hyper transfused thalasemic patients is early recognition and timely treatment of endocrine dysfunction. This is especially true for thyroid dysfunction, because hypothyroidism can be associated with growth problems which are common in these patients. The present study shows that T4 levels were in normal range in all patients except one while TSH level was high in 22 patients and normal in remaining 53 patients. Out of 75 patients who were tested 22 had hypothyroidism, These results are comparable to the study carried by Malik et al[1] which reported the frequency of hypothyroidism as 25.7% (in a study group of 70 patients aged 5-14 years) in thalasemia major patients. In our study this was a little high, this variation has been attributed to difference in treatment protocols including different transfusion regimens and chelation therapies in different centers.

Hypothyroidism may be partly caused by the deposition of iron in thyroid gland due to blood transfusion leading to gland dysfunction[10]. Iron overload is the most important complication of thalasemia and is the major concern for management.[11] Although most patients present with signs of iron overload in second decade of life with inadequate chelation, evidence from several liver biopsies in very young patients showed that the toxic effects of iron begins much earlier. The exact mechanism by which iron overload causes tissue damage is not known, though it is suggested that tissue iron deposits act at the cellular level causing damage by free radical formation and lipid peroxidation resulting in mitochondrial, lysosomal and sarcolemmal membrane damage. In thyroid gland it affects the production of thyroid hormones and manifests as varying degrees of primary hypothyroidism.

Thyroid failure is found to be more prevalent in older children, thus a correlation between old age and hypothyroidism is predicted in thalasemia major patients. The mean age of patients in our study is 10.48 year. It is also found that ferritin level is correlated with age. This is because the older patients would have longer blood transfusion period and as a result they need chelation therapy to reduce iron overload. In our study 22 patients were found to have subclinical hypothyroidism, were approximately eleven years old and they were not receiving regular chelation therapy. We also noticed that there is no significant relationship between gender and hypothyroidism, however a little higher incidence of hypothyroidism was found in females.

Further investigation in needed to associate the relationship between iron overload and thyroid dysfunction in beta thalasemic patients. Since serum ferritin is a poor indicator in massively overloaded patients, it is possible that the effect of iron on thyroid functions was underestimated in this study.

CONCLUSION

A high frequency of hypothyroidism in beta thalasemia patients found in this study supports the rationale for regular screening of thalasemic patients to ensure early detection and timely treatment of associated complications. Early detection and

prevention of these complications can improve the quality of life in these patients.

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