

PREVALENCE OF HYPOTHYROIDISM IN PATIENTS OF BETA THALASSEMIA RECEIVING BLOOD TRANSFUSION

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ABSTRACT

Background: Blood transfusions in thalassemia patients can affect thyroid gland. **Objective:** To determine the prevalence of hypothyroidism in patients of Beta Thalassemia receiving blood transfusion. **Methodology:** Study Design: Cross sectional study. Place and Duration of Study: Department of Pathology, Quaid i Azam Medical College/BVH, Bahawalpur from 1st January to 31st August 2017. A total of 100 patients with beta thalassemia major, aged 5 to 18 years were included in this study. Blood sample was drawn in the Pathology Department. Serum Thyroid Stimulating Hormone and fT_4 levels was measured with immunoassay hormone analyzer i 1000SR. Data was entered SPSS version 20. **Results:** In this study, 16% of beta thalassemia major patients were found to be hypothyroid. Mean age of the patients was 9.5 ± 2.7 years. Hypothyroidism was more among patients with more blood transfusions. **Conclusion:** This showed that many of the B thalassemia patients also has hypothyroidism. Beta thalassemic patients should be screened for hypothyroid so that complications can be prevented.

Key Words: Beta thalassemia, Major, Hypothyroidism, Blood transfusion.

INTRODUCTION

In normal adults, the major hemoglobin is hemoglobin A, a tetramer consisting of one pair of alpha chain and one beta chain.¹ Thalassemia is defined as a disease caused by reduced or absence of production of one or more globin chains thus disrupting the ratio.¹ It is estimated that there are approximately 9 million Beta thalassemic patients, which results in more than 5000 transfusion dependent births every year in Pakistan.² The combination of regular blood transfusion and chelation therapy is the standard management of Beta thalassemia to maintain Hb between 9-10g/dl.³ Repeated blood transfusions and improper chelation therapy lead to iron overload, which ultimately results in many endocrine complications like hypothyroidism.⁴ Hypothyroidism is a common complication in Beta thalassemic patients. In earlier studies prevalence of hypothyroidism ranged from 0-35% in beta thalassemic patients, who were receiving blood transfusions.^{5,6,7} The signs and symptoms of hypothyroidism are vague and subtle, and therefore the diagnosis of hypothyroidism can be missed clinically. Hence, early detection of hypothyroidism by the aid of chemical pathology can lead to timely management of these patients, resulting in improvement of their quality of life.⁸ The hypothyroidism is not related to serum ferritin level in thalassemia patients.⁹ Since the prevalence of hypothyroidism varies from study to study and no local study was done on its prevalence in this area, where cousin marriages

and hence prevalence of B thalassemia is quite common, so this study was designed to find out the prevalence of hypothyroidism in beta thalassemic patients receiving blood transfusions.

METHODOLOGY

Study design: Cross sectional study. Duration of study: From 1st January to 31st August 017. Setting: Department of Pathology, Quaid-i-Azam Medical College/BVH, Bahawalpur. Sample size: Sample size was determined by the formula; $n = Z^2P(1-P)/d$.² Where $z=1.96$, $p=13.5\%$,⁸ and $d=5.0\%$. The calculated sample size was 100 patients. Sampling Technique: Non-probability consecutive sampling.

Inclusion Criteria:

- 1- Beta thalassemic patients of both genders, and of age between 5 to 18 years.
- 2- Having history of twenty or more blood transfusions.

Exclusion criteria:

- 1- Patients with Beta Thalassemia intermedia.
- 2- Patients suffering from fever and sepsis (confirmed on history and clinical examination)
- 3- Patients having family history of hypothyroidism.

Children visiting the Pathology Department and fulfilling the inclusion criteria were selected for the study. Informed consent was taken from parents/guardian. Demographic characteristics (age, gender), weight and number of blood transfusions were noted. Blood samples were drawn in the Pathology Department. Serum Thyroid Stimulating Hormone and free T_4 levels were measured with

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Abbot's immunoassay analyzer i1000SR. Data was collected on a proforma.

Data was entered in and analyzed by using SPSS v.20.0. Mean \pm SD was used for quantitative variables like age, serum free T₄, serum TSH, weight and number of blood transfusions. Frequency and percentages were calculated for hypothyroidism. Effect modifiers like age, gender, weight and number of blood transfusions were controlled through stratification. Post stratification Chi-square test was applied and p value equal to or less than 0.05 was taken as significant.

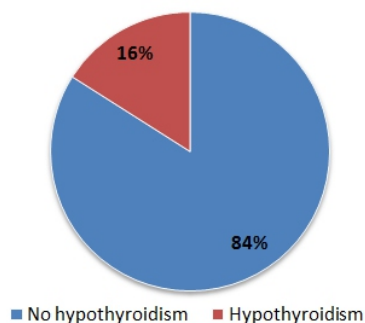
RESULTS

A total of 100 patients were included in the study. Most of the patients included in the study were male (60%) and belonged to district Bahawalpur. The mean age of the patients included in the study was 9.5 ± 2.7 years. Most of the patients (58%) belonged to the age group of 5 -10 years.

Table I: Descriptive Statistics of the study

Characteristics	Age (yrs)	Weight (kg)	Number of transfusions	TSH level (mIU/L)	fT4 Level (pmol/L)
Mean	9.51	19.76	33.24	6.21	5.577
Std. Deviation	2.672	5.668	8.182	2.861	1.6069
Minimum	5	10	20	2	2.3
Maximum	18	35	48	14	9.8

Figure I: Prevalence of hypothyroidism among B thalassemia patients



The mean serum TSH was 6.21 ± 2.86 mIU/L. The mean serum T₄ was 5.57 ± 1.60 pmol/L. Hypothyroidism was found in 16% of the total patients. On stratification of cases according to gender hypothyroidism was more common in males 9 out of 60 versus 7 out of 40 female patients which was not statistically significant ($p=0.738$). On stratification according to age, hypothyroidism was more common 9 out of 16 versus 7 out of 16 in 11-18 years, which was not

statistically significant ($p=0.294$).

On stratification of cases according to weight hypothyroidism was more common in weight 10-20Kg which was not statistically significant ($p=0.144$). On stratification of cases according to number of transfusions hypothyroidism was more common in 41-50 numbers of transfusions which was not statistically significant ($p=0.294$).

DISCUSSION

Severe anemia is the reason for multiple transfusions in thalassemic patients. Transfusion therapy improves the life expectancy of these patients but it has got many adverse effects. The patients who receive multiple blood transfusions, develop many endocrinopathies with the passage of time. These endocrinopathies include growth hormone deficiency, diabetes and hypothyroidism.¹⁰ Hypothyroidism in these patients is due to iron-overload in blood. This has been confirmed by histological studies.¹¹⁻¹⁴

Iron overload is reliably detected in these patients with the help of serum ferritin.⁵ The spectrum of variation in the prevalence of hypothyroidism in the patients receiving multiple transfusions ranges as low 13.5% to as high as 16-35%.⁵ Many reasons have been postulated for this wide range of prevalence of hypothyroidism in these thalassemic patients such as difference in methodology of thyroid function assessment, difference in age group of thalassemic patients and difference in medical therapy taken by patients.

Our data revealed the frequency of 16% of hypothyroidism in patients of beta thalassemia getting blood transfusion. The mean age of hypothyroid patients of our population was 10 ± 0.5 years. In our study, 16 patients were suffering from hypothyroidism. Out of 16 patients 9, were male and 7 were female. A similar study was conducted in Karachi by Malik et al,¹² which showed 18 out of 70 patients were suffering from hypothyroidism. Among the 18 hypothyroid patients, there were 11 (23%) males and 7 (30%) females. Hence, not much difference existed in the frequency of hypothyroidism among boys and girls. Malik et al¹² have reported primary hypothyroidism in 18 (25.7%) out of 70 patients which is not consistent with our result. Among these, 17 has normal T₄ levels but high TSH levels which is labeled as Subclinical hypothyroidism however, one patient has a decreased T₄ level with high TSH (overt hypothyroidism).

In a study conducted in Iran F.Najafipour showed 16 % prevalence of hypothyroidism which is consistent with our result.¹⁰ A similar study in Italy showed a presence of hypothyroidism in 11% in beta-thalasemic patients.¹³ Another study showed the prevalence of hypothyroidism in beta thalasemic patients, to be 1% in Tehran.¹⁴ Another study conducted in Egypt showed totally contradictory results, in that study only subclinical hypothyroidism was seen in 19.2% of the cases and none of the cases had overt hypothyroidism.¹⁵ Whatever is the prevalence of hypothyroidism in thalassemic patients, one thing is clear that there is a greater probability of other complications, which include multi endocrine dysfunctions, deterioration of previously compromised cardiac functions, prominent growth failure, liver disease, ultimately requiring splenectomy during process of the disease.¹¹

CONCLUSION

In conclusion subclinical or overt hypothyroidism was found in a large number of patients having thalassaemia major however, prominent signs were absent. It is suggested that regular follow-up with the purpose of early diagnosis and timely treatment of such complications be considered while dealing beta thalassemic patients.

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