Frequency of Hypothyroidism in Transfusion Dependent Thalassaemia Patients at a Tertiary Care Hospital

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of hypothyroidism in TDT patients in our population is not established yet. This study was to recognize the frequency of hypothyroidism in transfusion dependent thalassaemia patients.

ABSTRACT

Background: Thyroid dysfunction in Transfusion Dependent Thalassaemia (TDT) patients occurs because of iron accumulation in thyroid gland. **Objective:** The aim of the study was to determine the frequency of hypothyroidism in transfusion dependent thalassaemia (TDT) patients. **Method:** A total of sixty-four (64) transfusion dependent thalassaemia patients were included in this cross-sectional study from April 2018 to September 2019 according to selection criteria. Thyroid hormone status was assessed by estimation of Serum Free Thyroxine (FT₄) and serum Thyroid Stimulating Hormone (TSH). **Results:** The study sample consisted of 43 male and 21 female TDT patients, with a mean ($\pm$ Standard Deviation [SD]) age of 26 ($\pm$ 10) years. Total 28% patients were found hypothyroid, among them 11% were overt hypothyroid and 17% were subclinical hypothyroid. **Conclusion:** Replacement of thyroid hormone is cheap and easy. So, it must be carried out as this would significantly improve the quality of life.

Key words: Hypothyroidism, Transfusion Dependent Thalassaemia (TDT), Thyroid Stimulating Hormone (TSH), Serum Free Thyroxine (FT₄).

Introduction

Thalassaemia is a hereditary haemoglobin disorder which is clinically of two types TDTs and Non-Transfusion Dependent Thalassaemia (NTDTs). TDT patients require repeated blood transfusion and each unit of red cell concentrate (RCC) contains approximately 200 milligrams of iron which eventually causes iron deposition in various organs like liver, heart, endocrine glands etc. Thyroid dysfunction in TDT patients occurs as a result of iron accumulation in thyroid gland.¹⁻³ Abnormal thyroid function has been reversed to normal by means of intensive chelation therapy. Prompt recognition and timely management of this disorder can ensure a better quality of life. The exact frequency

Materials and Methods

This was a cross sectional observational study, conducted in Department of Haematology and Department of Endocrinology, Bangabandhu Sheikh Mujib Medical

University (BSMMU), from April 2018 to September 2019. A total of 64 diagnosed transfusion dependent thalassaemia patients were enrolled following selection criteria. Informed written consent was taken from the study subjects prior to enrolment. Ethical issues were resolved by the institutional review board and were addressed to every patient. All patients were interviewed by structured questionnaire. Blood sample (5ml) was collected from each patient following standard laboratory protocol and was sent to department of microbiology, BSMMU for analysis of serum FT₄ and TSH by immunoassay using direct chemiluminescent technology. Quality assurance measures were taken. All data were checked after collection and entered computer software. Statistical analysis was done using Statistical Packages for Social Science (SPSS-24).

Results

In this study 64 patients were included according to selection criteria. Among them, 43 (67.2%) were male and 21 (32.8%) were female. Mean age of the study population was 26 ± 10 years and range of age distribution was 11-62 years. Mean height was 158.7 cm, mean weight was 48.2 kg and mean BMI was 19.1 kg/m^2 .

Table 1: Demographic characteristics of the study population. (n: 64)

Characteristics	mean $\pm$ SD	n (%)
Age (years)	25.5 ± 10.3	
Gender		
Male		43 (67.2)
Female		21 (32.8)
Height (cm)	158.7 ± 7.4	
Weight (Kg)	48.2 ± 7.4	
BMI (kg/m^2)	19.1 ± 2.2	

Holding serum TSH level $0.35\text{-}5.5 \mu\text{IU/ml}$ as normal according to laboratory reference range, 46 patients (72%) had normal TSH level and 18 patients (28%) had high level of TSH. The mean serum TSH was found $5.5 \pm 5.3 \mu\text{IU/ml}$ with a range of $1.17\text{-}24.17 \mu\text{IU/ml}$. Considering serum FT₄ level $0.8\text{-}1.8 \text{ ng/dl}$ as normal, 57 (89%) patients had normal serum FT₄ level and only 11% patients had low serum FT₄ level. Mean serum FT₄ was found $1.1 \pm 0.3 \text{ ng/dl}$ with range from $0.1\text{-}1.5 \text{ ng/dl}$.

Table 2: Distribution of the study population according to Serum TSH and FT₄ level. (n: 64)

Serum TSH ($\mu\text{IU/ml}$)	n (%)	Mean $\pm$ SD	min-max	p-value
Normal ($0.35\text{-}5.5 \mu\text{IU/ml}$)	46 (71.9)	2.99 ± 1.11	1.46-5.26	
High ($> 5.5 \mu\text{IU/ml}$)	18 (28.1)	5.93 ± 1.53	5.52-24.17	<0.001
Total	64 (100)	5.5 ± 5.3	1.2 - 24.2	
Serum FT ₄ (ng/dl)				
Normal ($0.8\text{-}1.8 \text{ ng/dl}$)	57 (89.1)	3.45 ± 4.71	0.9-19.68	
Low ($<0.8 \text{ ng/dl}$)	7 (10.9)	0.64 ± 0.18	0.36-0.74	<0.001
Total	64 (100)	1.1 ± 0.3	0.1 - 1.5	

Thyroid status of the study population revealed 46 (72%) patients were in euthyroid state and 28% were hypothyroid. Among hypothyroid patients 11 patients (17%) were subclinical hypothyroid and 7 patients (11%) were overt hypothyroid. (Figure 1)

Figure 1: Pie chart showing thyroid status of the study population. (n: 64)

Discussion

This observational study assessed thyroid status of 64 TDT patients and found 11 (17%) of them were subclinical hypothyroid and 7 (11%) of them were overt hypothyroid. Thyroid status of the study population revealed almost a quarter of patients (28%) were hypothyroid. Among hypothyroid patients, 11 patients (17%) were subclinical hypothyroid and 7 patients (11%) were overt hypothyroid. About three fourth (72%) patients had normal serum TSH. On the other hand, only 11% of patients were with low FT₄. The frequency of hypothyroidism in transfusion dependent thalassaemia ranges from 6 to 30%.⁴ The wide variations of result of different studies may be due to differences in genotypes, age, ethnic variations and different treatment protocols, including different transfusion rate and chelation therapy.⁵ In West Bengal of India, Ghosh et al. found 23.5% patients were subclinical hypothyroid among their 68 study patients, whereas in Mumbai in India, Agarwal et al. found 12.5% patients were subclinical hypothyroid and 6.9% patients were overt hypothyroid among total 72 study patients.^{6,7} A study in Khulna, Bangladesh showed hypothyroidism in general population is 4.9%.⁷ So, hypothyroidism was more common among TDT patients than general population. Delay in diagnosis, inadequate transfusion, lack of knowledge and motivation for iron chelation therapy, lack of national health policy to support TDT patients and lack of availability of iron chelation therapy in different parts of country contribute to high frequency of hypothyroidism in our study population.

Conclusion

Replacement of thyroid hormone is cheap and easy. So, it must be carried out as this would significantly improve the quality of life. A high prevalence of hypothyroidism noted in this study supports the rationale for regular follow-up of transfusion dependent thalassaemia patients to ensure early detection and timely treatment of associated complications.

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