Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.5368

FREQUENCY OF HYPOTHYROIDISM IN PATIENT WITH BETA THALASSEMIA MAJOR

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Abstract

Background: Hypothyroidism is a frequently seen result of beta thalassemia. The objective of this research was to assess the prevalence of the phenomenon and examine its associations with patient features and the duration of transfusions.

Objective: the goal of this cross-sectional study at the Thalassemia Centre was to ascertain the frequency of hypothyroidism among 72 pediatric patients with beta thalassemia major, as well as any associations with age, transfusion duration, and serum ferritin.

Study design: A cross-sectional study.

Duration and place of study: The department of pediatrics Combined Military Hospital Rawalpindi from 05-July 2023 to 05-Dec 2023

Methods: There are seventy-two patients with significant beta thalassemia. The mean age of the patients was 11.72 ± 4.03 years. n=72 patients (65.3%), with 34.7 percent of the female and male both patients being 6 to 13-year. Participants in this cross-sectional research gave information on their demographics, serum ferritin, T4, TSH, and duration of transfusion at the Thalassemia Centre. For the analysis, SPSS version 26.0 was used. Of the participants, N-4 (13.8%) had overt hypothyroidism, while N-25 (86.2%) had subclinical hypothyroidism, which accounted for N-62 (86.1%). The patient's age and the length of the transfusion had a significant correlation with the prevalence of hypothyroidism. To sum up, prompt management of hypothyroidism and consistent observation are essential for enhancing the well-being of people with beta thalassemia major.

Results: The research included 72 pediatric patients who were diagnosed with beta thalassemia major. The patients' average age was 11.72 ± 4.03 years, with a significant number of male (65.3%) and female patients (34.7%). Among the male patients, the age range changed into 06 to 12 years, while female patients were between 6 and 13 years old. Of the 72 pediatric patients included in the study, 29 (40.3%) have been diagnosed with hypothyroidism. Among these, 25 patients (86.2%) exhibited subclinical hypothyroidism, characterized by way of regular T4 levels with elevated TSH

levels. Only four patients (13.8%) were diagnosed with overt hypothyroidism, offering with low T4 levels in conjunction with higher TSH levels.

Conclusion: The study highlights the significance of regular surveillance and prompt intervention for hypothyroidism in pediatric individuals diagnosed with beta thalassemia major, with a particular focus on its notable correlation with patient age and length of transfusion.

Keywords: Hypothyroidism, beta thalassemia, pediatric patients, monitoring.

INTRODUCTION

The hematological disorder known as beta thalassemia major is distinguished by the decreased production of the beta-globin chain of hemoglobin, leading to intense anemia requiring lifelong transfusion therapy [1,2]. The quality of life and life expectancy of people with beta thalassemia major have been significantly enhanced due to notable advancements in management measures, they are predisposed to diverse complications because of chronic transfusions and iron overload, amongst which hypothyroidism stands out as one of the maximum common endocrine abnormalities [3,4].

Hypothyroidism, characterized by inadequate production of thyroid hormones by the thyroid gland, Beta thalassemia major has been well reported as a common problem among patients [5, 6, 7]. The regulation of metabolism is a crucial function performed by the thyroid gland, and average body feature, and its disorder can have profound effect on health and well-being [8]. Understanding the frequency of hypothyroidism in this patient population is critical for timely diagnosis and intervention to optimize scientific effects.

Despite its scientific importance, studies evaluating the superiority of hypothyroidism and its institutions with patient characteristics, especially age and transfusion duration, remain limited, particularly in pediatric populations [9,10]. Therefore, By performing a cross-sectional examination of pediatric patients diagnosed with beta thalassemia major, this research aims to address the existing knowledge gap and ascertain the prevalence of hypothyroidism, and discover its relationship with patient demographics, transfusion duration, and serum ferritin levels.

A cross-sectional study at the Thalassemia Centre, Department of Pediatrics, Combined Military Hospital Rawalpindi examined the prevalence of hypothyroidism in pediatric beta thalassemia essential patients and its relationship to patient characteristics and transfusion period. This research will improve medical practice and patient outcomes by adding to the information base and informing hypothyroidism treatment in beta thalassemia predominate patients.

Methods

A total of 72 pediatric patients diagnosed with beta thalassemia major were included in the research who have been receiving normal transfusion treatment at the Thalassemia Centre.Demographic statistics, such as age and gender, were collected from each patient. Clinical parameters together with serum ferritin levels, thyroxine (T4), and thyroid-stimulating hormone (TSH) levels have been measured the usage of standard laboratory procedures. Transfusion duration, defined as the length of time the patients were receiving transfusion therapy, was also recorded. Hypothyroidism was diagnosed based on laboratory parameters, including with T4 and TSH levels. Overt hypothyroidism become described as low T4 levels observed through improved TSH levels, at the same time as subclinical hypothyroidism became characterized by normal T4 levels with elevated TSH levels. Patients were categorized primarily based on their thyroid feature test results.

Statistical Analysis

Data analysis was done using SPSS 26.0. Frequencies, percentages, averages, and standard deviations were used to describe research participants' demographic and clinical characteristics. The frequency of hypothyroidism was determined, and associations between hypothyroidism and patient characteristics, Along with age and transfusion length, appropriate statistical tests, such as chi-square test or correlation analysis, were used to evaluate the data.

Ethical Considerations

The study protocol become approved by the institutional review board (IRB) of Combined Military Hospital Rawalpindi, making sure adherence to ethical principles and protection of participants' rights in the course of the study. Confidentiality of patients information was maintained, and all data were anonymized to make certain privacy.

Results

The research included 72 pediatric patients who were diagnosed with beta thalassemia major. The patients' average age was 11.72 ± 4.03 years, with a significant number of male (65.3%) and female patients (34.7%). Among the male patients, the age range changed into 06 to 12 years the 72 pediatric patients included in the study, 29 (40.3%) have been diagnosed with hypothyroidism. Among these, 25 patients (86.2%) exhibited subclinical hypothyroidism, characterized by way of regular T4 levels with elevated TSH levels. Only four patients (13.8%) were diagnosed with overt hypothyroidism, offering with low T4 levels in conjunction with higher TSH levels. The analysis revealed a large correlation among the frequency of hypothyroidism and patient age ($p < 0.05$) in addition to the period of transfusion therapy ($p < 0.05$). a better occurrence of hypothyroidism, with overt hypothyroidism more prevalent among the latter group. Furthermore, the length of transfusion therapy confirmed a widespread affiliation with the occurrence of hypothyroidism. Patients with longer transfusion durations were more likely to develop hypothyroidism, highlighting the potential impact of transfusion-related factors on thyroid characteristic in patients with beta thalassemia major.

This study population did not reveal any statistically significant association between serum ferritin levels and the prevalence of hypothyroidism.

Table 1: Demographics of Study Participants

Characteristic	Number of Patients (n=72)	Percentage (%)
Total	72	100%
Mean Age (years)	11.72 ± 4.03	
Gender		
Male	47	65.3%
Female	25	34.7%
Age Range		
Male	06-08 years	
Female	06-12 years	

Table 2: Prevalence of Hypothyroidism Among Study Participants

Hypothyroidism Type	Number of Patients (n=29)	Percentage (%)
Total	29	40.3%
Overt Hypothyroidism	4	13.8%
Subclinical Hypothyroidism	25	86.2%

Table 3: Association of Hypothyroidism with Patient Characteristics

Patient Characteristic	Hypothyroidism Frequency (n=29)	Percentage (%)
Age		
Male (06-08 years)	27	93.1%
Female (08-12 years)	25	86.2%
Transfusion Duration		
Short (<5 years)	10	34.5%
Long (≥5 years)	19	65.5%

Table 4: Correlation Between Serum Ferritin Levels and Hypothyroidism

Serum Ferritin Level (ng/mL)	Hypothyroidism Frequency (n=29)	Percentage (%)
<1000	10	34.5%
1000-2000	8	27.6%
>2000	11	37.9%

Discussion

This study investigated the correlation between beta thalassemia major and various patient features, as well as the length of transfusions. The findings discovered the prevalence of hypothyroidism, with subclinical hypothyroidism being greater not unusual than overt hypothyroidism. Additionally, patient age and the duration of transfusion treatment were identified as significant factors associated with the prevalence of hypothyroidism. The previous findings enhance our understanding of the clinical characteristics of individuals diagnosed with beta thalassemia major and underscore the need of consistent surveillance and timely management for thyroid dysfunction within this specific group. The present study's findings on the incidence of hypothyroidism are consistent with previous research that has shown a significant prevalence of thyroid problem among patients diagnosed with beta thalassemia major. Several published studies have reported comparable findings, with subclinical hypothyroidism being the most everyday form of thyroid disorder on this affected population. For instance, a study by De Sanctis et al. reported a prevalence of subclinical hypothyroidism of approximately 80% among pediatric patients with beta thalassemia major, consistent with the findings of the current study [11]. Furthermore, The correlation seen in our study between patient age and the prevalence of hypothyroidism supports previous research that emphasizes age as a substantial risk factor for thyroid problem in individuals with beta thalassemia major. Studies by Soliman et al. And Karimi et al. Our studies have shown a greater incidence of hypothyroidism in older people diagnosed with beta thalassemia major [12]. Regarding the relationship among transfusion length and hypothyroidism, our study found that patients with longer transfusion duration were more likely to develop hypothyroidism. This findings is align with a study by Borgna-Pignatti et al., found that patients with beta thalassemia major who had transfusion therapy for a long time had an increased risk of developing thyroid disorders[13]. The findings of research have several implications for clinical practice and studies in the field of beta thalassemia major. Firstly, the excessive prevalence of hypothyroidism underscores the significance of regular screening and tracking for thyroid disorder in pediatric patients with beta thalassemia major to facilitate early detection and intervention. Secondly, the affiliation between affected patients age and transfusion length with the frequency of hypothyroidism highlights the need for tailored management techniques based on male or female patient characteristics.

Conclusion

The findings of this study contribute to our information of the epidemiology and clinical variables of hypothyroidism in pediatric patients with beta thalassemia major. By identifying risk factors and associations with patient demographics and transfusion treatment, this study informs scientific selection-making and underscores the importance of comprehensive control strategies for optimizing the care of people with beta thalassemia major and concurrent hypothyroidism.

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