Original Article

Relationship of Hypoparathyroidism with Patients of Beta Thalassemia Major in a Tertiary Care Hospital

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ABSTRACT

Objective: To determine the relationship of hypoparathyroidism with patients of beta thalassemia major in a tertiary care hospital.

Study Design: Cross-Sectional descriptive study.

Place and Duration of Study: This study was conducted at the department of Pediatric medicine Hayatabad Medical Complex Peshawar from July to December 2021.

Materials and Methods: A total number of 161patients with beta thalassemia fulfilling the inclusion criteria were included in the study. Patients were assessed through detail history, followed by clinical examination and laboratory investigations of serum level of calcium, phosphorus, haemoglobin, and serum parathyroid hormone. The data was recorded on a predesigned proforma. The data was analyzed by SPSS version 22.

Results: Majority of thalassemic patients were male (70.7%) with a mean age of 12.79±1.80 years. Mean weight 19.39±4.88 kg. High serum ferritin level was found in 39.7% and 37.9% of patients had low parathyroid hormone levels. Hypoparathyroidism was non- significantly associated with gender and age; while significantly associated with hemoglobin, serum calcium, ferritin, phosphorus, weight and height in thalassemic individuals.

Conclusion: Hypoparathyroidism is not an uncommon complication of beta thalassemia major necessitating early diagnosis and management of hypoparathyroidism in beta thalassemic patients.

Key Words: Beta thalassemia major, hypoparathyroidism, parathyroid hormone

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INTRODUCTION

Beta thalassemia is one of the hemolytic conditions causing a big burden to pediatric unit admission. The approximate carrier number of beta thalassemia gene is more than 250 million around the world while 40 millions of these gene carriers are in South East Asia. Almost 100,000 children are born with beta thalassemia major all over the world annually[1]. The number of beta thalassemia trait is one in 100,000 around the world[2] and is affecting certain region and ethnic groups more as compared to others[3-5].

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Beta thalassemia is the most prevalent hematological disorder in the world in which one gene is involved. This is autosomal recessive disorder and has two major types including alpha and beta thalassemia depending on gene affected on the globin chain. The usual presentation of beta thalassemia major is around 4-6 months of life. The diagnosis is made by 6 months of age as the fetal hemoglobin of the infants normally reaches to its minimum concentration by six months of life. Therefore the condition is diagnoses on raised blood Hb F on Hemoglobin electrophoresis. The mainstay of the treatment in beta thalassemia major is to keep blood Hemoglobin level ≥ 10 gm/dl. The patient developed many complications even with the proper management including bone metabolism[6].

The most frequently occurring bone metabolism complication is hypoparathyroidism. M Majority of BTM patients have high levels of iron in various body tissues. The same is true about the endocrine system deposition of iron as well. The deposition of iron in the parathyroid glands leads to decreased function of the parathyroid hormone and leads to hypothyroidism. The decrease in parathyroid hormone leads to bone resorption[7,8,9]. One of the studies has documented frequency of hypoparathyroidism 18 % in children presenting with beta thalassemia major[12].

Hypoparathyroidism is characterized by decreased in calcium level and phosphorous levels in the presence of decreased PTH level. This may lead to calcification of different cerebral tissues. No doubt the toxic effects of iron storage in parathyroid gland have been documented in literature as a key factor in the development as well as progression of hypoparathyroidism in thalassemic children. However, there is lack of association of between serum ferretin level and development of HPT[10,11].

The rationale of this study was to determine the relation between hypothyroidism and serum ferretin in beta thalassemia patients as it is one of the endocrine complications associated with beta thalassemia major.

MATERIALS AND METHODS

A total number of 161 patients with beta thalassemia were included in the study. Already diagnosed cases of beta thalassemia major from age 10 to 16 years; both gender and completely transfusion dependent were included in the study. Patients with diagnosis of beta thalassemia intermedia and minor, with family history of thyroid disorders, on hormonal therapy and with acute medical illness were excluded from the study.

All confirmed cases of beta thalassemia major from OPD and emergency units of the department of pediatrics Hayatabad Medical Complex Peshawar were enrolled for current study. The purpose and benefits of the study were explained, and a written informed consent was taken from parents/guardians of children enrolled in the study.

Children were assessed through detail history, followed by clinical examination. Samples of blood were taken from children under strict aseptic techniques and were sent to hospital laboratory for investigation. Serum level of calcium, phosphorus, hemoglobin, and serum parathyroid hormone was investigated.

The patient's biodata including name, age, gender and address were recorded on a pre-designed proforma. The exclusion criterion was also followed strictly to control confounders and bias in the study.

The Collected data was then entered into computer for analysis using SPSS version 21. Variables like age, serum calcium, phosphorus, hemoglobin, weight and serum parathyroid hormone levels were presented in terms of mean and standard deviation; while frequency and percentages were used in case of gender and hypoparathyroidism. Hypoparathyroidism was also placed in the form of stratifications for hemoglobin, age and gender. After the process of stratification we used chi square test and p value ≤ 0.05 was labeled as significant one. All results were presented in the form of tables and charts.

RESULTS

After analysis we found that majority of thalassemic patients were male (70.7%) with a mean age of 12.79±1.80 years Mean weight and height were 19.39±4.88 kg and 119.88±6.38 cm respectively According to biochemical parameters mean hemoglobin level was 11.48±2.70 mg/dl, 39.7% had high serum ferritin, 38.8% had low serum calcium levels, while 37.9% had low serum phosphorus and 37.9% had high parathyroid hormone levels.

Biochemical variables are shown in table 1 while Hypoparathyroidism was found in 37.9% of thalassemic patients as given in table 2.

Table No.1: Biochemical Variables of studied individuals (n=116)

Variables		Frequency (%)/Mean±SD
Hemoglobin		11.48±2.70
Hemoglobin categories	Normal (>12 mg/dl)	71 (61.2)
	Low (< 12 mg/dl)	45 (38.8)
Serum ferritin		187.64±105.59
Serum ferritin categories	Normal (7-142ng/ml)	70 (60.3)
	High (>142ng/ml)	46 (39.7)
Serum calcium		7.61±2.19
Serum calcium categories	Normal (8-10 mg/dl)	71 (61.2)
	Low (<8 mg/dl)	45 (38.8)
Serum phosphorus		4.74±0.96
Serum phosphorus categories	Normal (3.7-4.5 mg/dl)	72 (62.1)
	High (>4.5 mg/dl)	44 (37.9)
Parathyroid hormone		25.40±16.35
Parathyroid hormone categories	Normal (10-60pg/ml)	72 (62.1)
	Low (<10 pg/ml)	44 (37.9)

Table No.2: Frequency of Hypoparathyroidism in studied individuals (n=116)

Variables		**Frequency (%)**
Hypoparathyroidism	Yes	44 (37.9)
	No	72 (62.1)

Table No.3: Stratification of Hypoparathyroidism among Hemoglobin Level (n=116

Variables		Frequency		P-value
		Hypoparathyroidism		
		Yes	No	
Hemoglobin	Normal	03	68	0.00
	Low	41	04	

Table No. 4: Stratification of Hypoparathyroidism among Calcium Level (n=116)

Variables		Frequency		P-value
		Hypoparathyroidism		
		Yes	No	
Serum calcium	Normal	03	68	0.00
	Low	41	04	

Stratification of Hypoparathyroidism among Hemoglobin, Calcium, phosphorous and parathyroid hormone levels are shown in tables 3, 4, 5 and 6 respectively. PTH level of 10-60 pg/ml was taken as normal and less than 10 pg/ml were labeled as hypoparathyroid.

Table No.5: Stratification of Hypoparathyroidism among Phosphorus Level(n=116)

Variables		Frequency		P-value
		Hypoparathyroidism		
		Yes	No	
Serum phosphorus	Normal	03	69	0.00
	High	41	03	

Table No. 6: Stratification of Parathyroid Hormone level with Hypoparathyroidism (n=116)

Variables		Frequency		P-value
		Hypoparathyroidism		
		Yes	No	
Parathyroid hormone	Normal	01	71	0.00
	Low	43	01	

DISCUSSION

Beta Thalassemia major is a frequently observed hemolytic condition in pediatric age. Iron deposition leads to lot complications including endocrinopathies in BTM patients who are getting blood transfusions regularly for a long period[12]. Hypoparathyroidism is one of the most common complications amongst endocrinopathies in these patients at the end of first decade and in second decade of life[13-15]. Though HPT is commonly associated endocrinopathy associated with BTM yet not that common due to regular chelation therapy now a day's all over the world. In our study we found the frequency of hypoparathyroidism was 37.9 % in patients with beta thalassemia major. The study results are related with studies conducted by Gamberini et al[16] and Khider MR et al[17]. The frequency of HPT in studies conducted by Mostafavi et al[19], Adil et al[19] was 22.7% and 35.3% respectively. Tangngam H et al observation of HPT was also quite high i.e. 38 % but according to their study all the cases had not manifested clinically rather a big chunk of patients with HPT were asymptomatic[20]. Some of the studies have shown the frequency of HPT in beta Thalassemic major patients as low as 14.6 % and 13.6 %[21,22].

In our study we found the mean age was 12.709±1.80 years while most of patients were male (70.7 %). But either age or gender were not significantly associated with hypoparathyroidism. Tangngam H et al observations regarding association of HPT with sex and age were not having any significant differences[20].

Serum calcium, phosphorus and parathyroid hormone were significantly associated with hypothyroidism on thalassemic patients in present study. The levels of parathyroid hormone has a key role in the diagnosis of hypoparathyroidism its normal activity keeps serum calcium level normal, same is true about vitamin D; and calcitonin also plays some role. Basha KPN et al also documented significantly decreased levels of parathyroid hormone, calcium and serum phosphate levels[23].

Serum ferritin level was observed high (39.7%) and had significantly association with thalassemic patients having hypoparathyroidism. Multiple studies have documented close relation of HPT with raise level of serum ferritin. Studies have documented that those patients with beta thalassemia major who have high levels of serum ferritin to an extent of ≥ 2500 ng/ml are prone to develop hypoparathyroidism more frequenly[23],[24],[25].

Weight and height were significantly associated with hypoparathyroidism in thalassemic patients in the current study. The same results have been documented by other studies, where they have documented delayed in growth in majority of patients with beta thalassemia major and the condition becomes very obvious at puberty where growth spurt. Though multiple factors are responsible including folic acid deficiency, anemia of chronicity, serum ferritin deposition in glands including hypothyroid, thyroid and pituitary glands[25,26].

CONCLUSION

Hypoparathyroidism was frequently prevalent in beta thalassemic patients and significantly associated with derangement in biochemical parameters including calcium and phosphorous. HPT is not an uncommon complication of BTM which necessitates early diagnosis and management. Hypoparathyroidism has significant association high serum ferritin level in patients with beta thalassemia major.

Therefore, we recommend regular assessment of beta thalassemia patients for both endocrionopathies especially hypoparathyroidism and serum ferritin to get best possible health status of these chronically ill patients.

Author's Contribution:

Concept & Design of Study:	Muhammad Bilal Khattak
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Final Approval of version:	Muhammad Bilal Khattak

Conflict of Interest: The study has no conflict of interest to declare by any author.

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