

## An Association of Serum ferritin and SGPT Level in Transfusion dependent Thalassaemia major Patients-A Cross Sectional Study

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### Abstract

**Background :** The Thalassaemia is an inherited haemoglobin disorder causes hemolytic anemia which usually requires life-long blood transfusion therapy. Therefore transfusion dependent thalassaemia major patients suffer from the effect of deposition of excess iron in the liver, heart and endocrine glands.

**Objective :** The aim of present study was to find out the association of serum ferritin and SGPT in transfusion dependent thalassaemia major patient.

**Methodology :** This cross sectional study was carried out in Day care unit (DCU) of Transfusion Medicine department, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, during January 2014 to December 2014. Total of 110 clinically diagnosed Thalassaemia major (TM) between (5-35 years) cases of either sex from the above mentioned department attending the DCU were selected purposively for this study. Data were collected on clinical examination findings, laboratory investigations, ABO and Rh Blood Group, Serum ferritin and SGPT (Serum glutamic pyruvic transaminase) after taking informed consent.

**Results :** The following observations and results were obtained in this study. The mean age was found  $17.15 \pm 8.77$  years with range from 5 to 35 years and male to female ratio was 1.2:1 (male 59 and female 51). Sixty eight (68.0%) patients came from rural area, 43.6% patients were student, 77.3% patients had completed primary education, 57.3% of the patients came from middle class family and 72.7% patients were unmarried. About 46.4% of the patients had moderate anaemia, 28.2% had jaundice, 79.1% had hepatomegaly, 82.7% had splenomegaly and 30.9% had complication due to iron overload. Mean haemoglobin (Hb%) was found  $6.65 \pm 1.63$  gm/dl, mean serum ferritin was found  $3785 \pm 17637$   $\mu$ g/L and mean SGPT was found  $134.8 \pm 77.94$  U/L. There was a significant positive correlation ( $r=0.259$ ;  $p=0.006$ ) between serum ferritin and SGPT.

**Conclusion :** Considering the study result it can be concluded that there is a positive significant correlation between serum ferritin with SGPT level.

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### Introduction

Thalassaemia is the most common genetic blood disorder and its incidence varies in different population group of the world. An overview of the global distribution of thalassaemia shows that in addition to the Mediterranean countries in which they were first recognized, thalassaemia are frequently found in Asia and the Far East. World Health Organization (WHO) estimates that at least 6.5% of the world populations are carriers of different inherited disorders of haemoglobin<sup>1</sup>. Another WHO reports estimates that 3% are carriers of beta thalassaemia major and 4% are carriers of HbE in Bangladesh out of 7000 new born babies. In Bangladesh, more than 7000 children are born with thalassaemia

each year.<sup>2</sup>

Despite the increased life expectancy of thalassaemia patients complications of the disease is keep arising<sup>3</sup>. Frequent blood transfusion in thalassaemia major carry the adverse effect of iron build up in the body<sup>4</sup>. Thus repeated blood transfusion in thalassaemic patients is a double edges sword<sup>5</sup>. Iron overload may damage the liver, heart and endocrine glands leading to debilitating and life threatening problems<sup>6</sup>.

Even though the primary genetic defect resides in a single gene (i.e., beta globins) expressed only during terminal maturation of red cell progenitors, many organ systems are affected. Patients of thalassaemia suffer

simultaneously from severe and chronic anemia, the stigmata of chronic hemolysis, organ damage from transfusional iron overload, the profound local systemic effects of a rapidly and relentlessly expanding mass of erythroid bone marrow progenitor.<sup>7</sup>

Determination of the liver iron concentration is still regarded as the best predictor of total body iron, but the procedure is invasive and has risks. Quantitative, non-invasive methods for measuring body iron are needed that are safe, accurate and readily available. Iron overload is caused by increased intestinal absorption or by blood transfusions. The effective management of iron overload requires frequent evaluation of body iron stores. Measurement of serum ferritin, although easy to perform, gives results that are too variable for the accurate prediction of total body iron.

Liver disease is common in thalassaemia major patients and severe haemochromatosis is still observed in 30-40% of patients despite iron chelation.<sup>8</sup> The prevalence of cirrhosis is reported to be 10-40%<sup>9</sup> and the prevalence of liver fibrosis is about 40-80%.<sup>10</sup> Though the number of reported deaths from liver disease in thalassaemia major is small, severe haemosiderosis and hepatic fibrosis may lead to cirrhosis. Early and accurate diagnosis of liver disease followed by prompt intervention may prevent liver disease progression.

The aim of this study was to understand the association between serum ferritin and SGPT in transfusion dependent thalassaemia major patients.

**Materials and Methods**

This cross sectional study was carried out to find out the effect of iron over load on liver function in transfusion dependent thalassaemia major patients. A total of 110 clinically diagnosed case of thalassaemia major patients attending the Day care unit (DCU) of Transfusion Medicine department of Bangabandhu Sheikh Mujib Medical University, Dhaka during January 2014 to December 2014, were selected purposively for this study.

The inclusion criteria were -

- i) patients of 5 to 35 years and of both sexes
- ii) all blood transfusion dependent thalassaemia cases confirmed by history, clinical exam and Hb% electrophoresis
- iii) duration of transfusion of each case must be 5 years or more
- iv) patient who gave consent or whose attendant gave consent to comply the study procedure

Exclusion criteria were

- i) patients age less than 5 years and more than 35 years,
- ii) who had chronic liver disease due to other causes,
- iii) started iron chelation therapy
- iv) patients who were unwilling to give informed consent to take part in the study

The preliminary screening for each patient was completed on taking history, doing physical examination and the necessary laboratory tests. Data were collected on clinical examination findings, laboratory investigations, (ABO and Rh Blood Group, Hb%, Serum ferritin and Serum glutamic pyruvic transaminase (SGPT).

**Results**

In the present study it was observed that 51(46.4%) patients had moderate anaemia, 31(28.2%) had jaundice, 27(24.5%) had mild oedema, 101(91.8%) had normal pulse (60-90 beats/min), 105(95.5%) had normal blood pressure (Systolic BP 110-140/ Diastolic BP 60-90 mmHg), 100(90.9%) had normal temperature (97-99°F), 87(79.1%) had hepatomegaly, 91(82.7%) had splenomegaly (Table I).

**Table I : Distribution of the study patients by clinical examination (n=110)**

Clinical examination	Number of patients	Percentage
<b>Anaemia</b>		
Mild	35	31.8
Moderate	51	46.4
Severe	24	21.8
<b>Jaundice</b>		
Yes	31	28.2
No	79	71.8
<b>Oedema</b>		
Mild	27	24.5
Moderate	2	1.8
Nil	81	73.6
<b>Pulse beats/min</b>		
Normal (60-90/min)	101	91.8
Tachycardia (>90/min)	9	8.2
<b>Blood pressure (BP)</b>		
Normal (Systolic BP 110-140/Diastolic BP 60-90 mmHg)	105	95.5
Hypertensive (Systolic BP >140/ Diastolic BP >90 mmHg)	5	4.5
<b>Temperature</b>		
Normal (97-99°F)	100	90.9
High (≥100 °F)	10	9.1
<b>Liver</b>		
Hepatomegaly	87	79.1
Not enlarged	23	20.9
<b>Spleen</b>		
Splenomegaly	91	82.7
Not palpable	19	

Hepatomegaly-Palpation of liver 2cm below the costal margin  
 Splenomegaly-Mild:<4cm, Moderate: 4 to 8cm,Severe:>8cm  
 from the left costal margin along its long axis.

Regarding blood group and Rh typing of the patients, it was observed that each blood group of O and B patients were 37 (33.6%). Rh type positive was found in 106(96.4%) patients (Table II).

**Table II: Distribution of the study patients by blood group (n=110)**

Blood group with Rh typing	Number of patients	Percentage
<b>Blood group</b>		
A	24	21.8
B	37	33.6
AB	12	10.9
O	37	33.6
<b>Rh typing</b>		
Positive	106	96.4
Negative	4	3.6

Haemoglobin percentage of patients showed that 65(59.0%) patients had Hb% 1-6 gm/dl. The Mean Hb% was found 6.65±1.63 gm/dl with range from 2 to 9 gm/dl. (Table III).

**Table III : Haemoglobin percentage (Hb%) of the study patients (n=110)**

Haemoglobin percentage Hb% (gm/dl)	Number of patients	Percentage
1-6	65	59.0
7-9	45	41.0

Mean ± SD 6.65 ±1.63

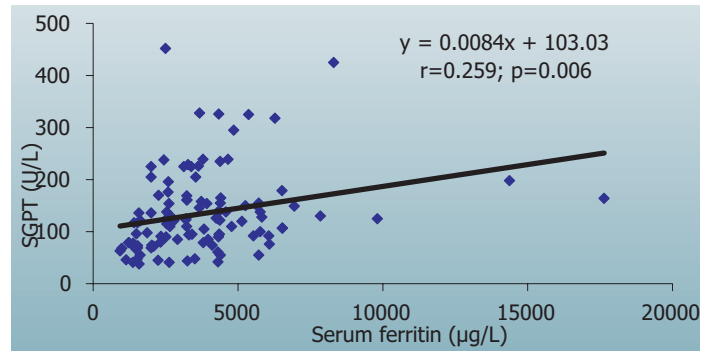
Biochemical investigations of the patients, it was observed that 108(98.2%) patients had serum ferritin >1000 µg/L and mean serum ferritin was 3785±17637 µg/L. Regarding SGPT, 101(91.8%) had SGPT 51-500 U/L and mean SGPT was 134.8±77.94 U/L (Table IV).

**Table IV: Biochemical investigations of the study patients (n=110)**

Biochemical investigations	Number of patients	Percentage
<b>Serum ferritin (µg/L)</b>		
200-1000	2	1.8
>1000	108	98.2
Mean ± SD 3785±2406		
<b>SGPT (U/L)</b>		
35-50 U/L (normal)	9	8.2
51-500 U/L	101	91.8
Mean ± SD 134.8 + 77.94		

Mean ± SD 134.8 + 77.94

A significant positive correlation (r=0.259; p=0.006) between serum ferritin and SGPT.



**Figure 1 : Scatter diagram showing positive correlation (r=0.259; p=0.006) between serum ferritin and SGPT**

**Discussion**

Thalassaemia major is characterised by inadequate globin chain synthesis, leading to ineffective erythropoiesis, severe anaemia and chronic disease in adulthood.<sup>11</sup> In this study it was observed that 51(46.4%) patients had moderate anaemia, 31(28.2%) had jaundice, 27(24.5%) had mild oedema, 101(91.8%) had normal pulse (60-90 beats/min), 105(95.5%) had normal blood pressure (SBP 110-140/DBP 60-90 mmHg), 100(90.9%) had normal temperature (97-99°F), 87(79.1%) had liver enlarged, 91(82.7%) had spleen palpable. Veglio et al. (1998) observed in their study that more than 9(40%) of the thalassaemia major patients did not show a significant diurnal BP and HR rhythm.<sup>12</sup> In thalassaemia major patients, the overall amplitude of systolic BP, diastolic BP, and HR was significantly lower than in controls (P <0.05).

In this current study it was observed that 37(33.6%) patients was found blood group O and B respectively. Rh type was positive in 106 (96.40%) patients. Mean Hb% was found 6.65±1.63 gm/dl, mean serum ferritin was found 3785±17637µg/L and mean SGPT was found 134.8±77.94 U/L. Riaz et al. (2011) observed Blood group "O" was to be the predominant in 39(49.4%), Blood group A was found 17(21.6%), Blood group B was 21(26.4%), Blood group AB was 2(2.6%) and the mean serum Ferritin level in their study were 4236.5 ng/ml.<sup>13</sup> Yin et al (2011) reported 56(44.6%) of patients maintained their hemoglobin levels >9.0 g/dl<sup>14</sup>. Shamshirz et al (2003) reported hemoglobin level before transfusion about 9.6±2.3 g/dl<sup>15</sup>.

In our study mean serum ferritin was found 3785±17637µg/L. Li et al. (2012) reported serum ferritin levels from the minimum of 1500 ng/mL up to a maximum of 11491 ng/mL.<sup>16</sup> Belhoul et al. (2012) reported the mean serum ferritin level 2597.2 ± 1976.8 µg/l<sup>17</sup> Cunningham et al.

(2004) reported ferritin levels from 147 to 11 010 ng/mL (median, 1696 ng/mL).<sup>18</sup> Mazza et al. (1995) reported ferritin levels between 276 and 8031 ng/mL.<sup>19</sup> Berak et al. (2004) reported ferritin levels  $2171.5 \pm 1439.8$  (103-5150 ng/m).<sup>20</sup> Mansouri-targhabeh and Badie (2004) reported ferritin levels  $2597 \pm 1976$  ng/mL.<sup>21</sup> The above findings are comparable with this study. In this study it was observed a positive significant correlation ( $r=0.259$ ;  $p=0.006$ ) between serum ferritin with SGPT. Similarly, a research on 104 patients with beta Thalassaemia major Hashemizadeh et al. (2012) showed a significant correlation between iron level as indicated by transferrin saturation or serum ferritin levels and SGOT, SGPT levels.<sup>22</sup>

### Conclusion

This study was undertaken to find out the association of serum ferritin and SGPT in transfusion dependent thalassaemia major patient. Majority of the patients were in 2nd decade and male predominant and there was a positive significant correlation between serum ferritin with SGPT level.

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