thalassemias are a group of congenital anemias associated with defective synthesis of one or more of the globin subunits of the normal human hemoglobin. This results in excess production of the other chain which damages the red cell membrane and causes hemolytic anemia [1]. Hepatic dysfunction is a frequent manifestation in thalassemic patients receiving multiple blood transfusions (BTs) as a part of treatment. The objective of the study was to study the liver function profile in thalassemic children and its correlation with the age of initiation of transfusion therapy. This cross-sectional study was done among 32 thalassemic patients in the age group of 1–18 years visiting a tertiary care hospital regularly for BTs at the Department of Pediatrics at the tertiary hospital of North India. Liver function tests (LFTs) were done in all thalassemic patients included total bilirubin, liver enzymes (serum glutamic oxaloacetic transaminase [SGOT], serum glutamic pyruvic transaminase [SGPT], and alkaline phosphatase [ALP]), total protein, serum albumin, serum ferritin, hepatitis B surface antigen (HBsAg), and anti-hepatitis C virus. The age of initiation of BT was also recorded. Derangement in LFTs and correlation between the age of initiation of transfusion therapy and derangement of liver function were studied. Out of 32 patients, only 7 (21.87%) had normal LFT values. A total of 17 (53.12%) had increased SGOT, 15 (46.87%) had increased SGPT, and 25 (78.12%) had increased bilirubin levels. Total protein and serum albumin were below normal in 5 (15.65%) and 3 (9.3%) patients, respectively. ALP was increased in 24 (75%) patients. Majority of the patients (43.75%) had serum ferritin between 2000 and 2999 ng/ml. Only two patients had significantly deranged LFTs. No patient was positive for HBsAg. However, we did not find a significant correlation between age of initiation of transfusion therapy and derangement of liver enzymes in these patients. If thalassemic patients are given properly tested blood and regular chelation therapy, liver function remains normal. Immunization against hepatitis B and testing of blood bags is recommended. It is also recommended that LFT should be done regularly at 3 months interval to detect any abnormality.
North India for BTs at the department of pediatrics. The study was approved by the Institutional Ethics Committee. All patients were enrolled for this study after informed consent from their parents and assent from children above the age of 7 years.

A thorough history and clinical examination were done and findings were recorded in predesigned pro forma. Liver function tests (LFTs) were done which included total bilirubin, liver enzymes (serum glutamic oxaloacetic transaminase [SGOT], serum glutamic pyruvic transaminase [SGPT], and alkaline phosphatase [ALP]), total protein, serum albumin, viral markers including hepatitis B surface antigen (HBsAg), and anti-HCV and serum ferritin level. The age of initiation of BT was also recorded. Derangement in LFTs and correlation between the age of initiation of transfusion therapy and derangement of liver function were studied.

Data were analyzed using statistical software MS Excel and SPSS for Windows. Data were reported as mean (SD) and proportions as deemed appropriate for quantitative and qualitative variables, respectively. Correlation between the age of initiation of transfusion therapy and derangement in LFTs was evaluated using Pearson correlation coefficient (r). Frequency and percentages were presented for qualitative variable.

RESULTS

The age-wise distribution of thalassemia patients is discussed in Table 1. The median age was 11.5 years.

In this study, majority of patients (75%) started receiving BT before the age of 1 year and 8 (25%) patients started after 1 year of age. However, we did not find any significant correlation between the age of initiation of BT and derangement of liver enzymes. In this study, males (18, 56.25%) were more in number than females (14, 43.75%).

The values of the LFTs in thalassemic patients are given in Table 2. The mean SGOT, SGPT, and serum bilirubin levels were 70.9±23.4 U/L, 60.8±18.1 U/L, and 1.91±0.08 mg/dL, respectively. The mean total protein and serum albumin were 6.28±0.72 and 3.27±0.35 g/dL, respectively. Significant derangement in liver enzymes was taken as twice the upper limit of reference range.

Table 1: Age-wise distribution of thalassemia patients

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–5</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>6–10</td>
<td>7</td>
<td>21.87</td>
</tr>
<tr>
<td>11–15</td>
<td>15</td>
<td>46.87</td>
</tr>
<tr>
<td>&gt;15</td>
<td>2</td>
<td>6.25</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Liver function tests in thalassemic patients

<table>
<thead>
<tr>
<th>Liver function tests</th>
<th>Serum bilirubin (%)</th>
<th>Serum glutamic oxaloacetic transaminase (%)</th>
<th>Serum glutamic pyruvic transaminase (%)</th>
<th>Alkaline phosphatase (%)</th>
<th>Total protein (%)</th>
<th>Serum albumin (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal value</td>
<td>7 (21.87)</td>
<td>15 (46.87)</td>
<td>17 (53.12)</td>
<td>8 (25)</td>
<td>27 (84.37)</td>
<td>29 (90.62)</td>
</tr>
<tr>
<td>Abnormal value</td>
<td>25 (78.12)</td>
<td>17 (53.12)</td>
<td>15 (46.87)</td>
<td>24 (75)</td>
<td>5 (15.62)</td>
<td>3 (9.37)</td>
</tr>
</tbody>
</table>

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DISCUSSION

Derangement in liver function is common in thalassemic patients receiving multiple BTs which are mainly due to iron deposition in liver and hepatitis. With regular iron chelation treatment, the degree of iron overload is reduced in most of our patients as also seen in other studies. In this study, 25 patients (78.12%) had deranged liver function. Significant increase in enzymes levels was seen in only 2 (6.25%) patients. Majority (43.75%) of the patients had ferritin value between 2000 and 2999 ng/ml and most of the patients (90.62%) were on chelation therapy.

In a study conducted by Singh et al., SGOT, SGPT, and ALP were found to be increased in 80%, 45%, and 87% of the patients, respectively [7]. Significant derangements of these enzymes were seen in 34%, 19%, and 9% patients, respectively. HBV and HCV were positive in 1% and 12% and serum total protein and albumin were low in 22% and 23% of patients, respectively. Serum bilirubin was increased in 53% of the patients. Majority (28%) of the patients had ferritin value between 2001 and 3000 ng/ml.

The results in our study were in accordance with another study conducted by Ayyash and Sirdah, where liver function was significantly deranged in thalassemic patients [8]. However, the mean serum ferritin levels were higher than that of our study. In another study conducted by Williams et al., the prevalence of HCV among thalassemic patients was 11.1% and 66.6% of patients showed evidence of HBV infection [9]. In another study conducted by Salama et al., none of the patient tested positive for HBV, but 50% of patients was anti-HCV positive [10]. Similarly, 24% of patients were tested positive for anti-HCV in a study conducted by Agrawal et al. [11]. This is in contrast to this study, in which no patient was HBsAg positive and only one patient was anti-HCV positive.

If thalassemic patients are given properly tested blood and regular chelation therapy, their liver function remains normal. Although mild derangement in liver function can be present due to multiple BTs, significant damage to liver can be controlled. In hepatitis seronegative thalassemic patients, regular BT along
with iron chelation therapy helps in maintaining liver function and decreasing iron overload in liver. It is recommended that immunization against hepatitis B and strict testing of blood bags at blood banks for hepatitis C must be done. It is also recommended that LFT should be repeated regularly at 3 months interval to detect any hepatic dysfunction.

**CONCLUSION**

In hepatitis seronegative thalassemic patients, regular BT along with iron chelation therapy helps in maintaining liver function and decreasing iron overload in liver. It is also recommended that LFT should be done regularly at 3 months interval to detect any hepatic dysfunction.

**REFERENCES**