Serum Ferritin Level of Transfusion Dependent Thalassaemia Patients - A Single Centre Study


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Introduction
Thalassaemia is a hereditary haemoglobin disorder which is mainly of two types TDTs and NTDTs. TDT patients require repeated blood transfusion which eventually causes iron deposition in various organs like liver, heart, endocrine glands etc.1-3 Abnormal organ function has been reversed to normal by means of intensive chelation therapy.4 Prompt recognition and timely management of iron overload can ensure a better quality of life. Serum ferritin is a cheap and easily available tool for measurement of body iron load. So, we measure serum ferritin level to determine body iron store.

ABSTRACT
The aim of the study was to determine serum ferritin level in transfusion dependent thalassaemia patients. A total of 64 transfusion dependent thalassaemia (TDT) patients were included in this cross-sectional study from April 2018 to September 2019 according to selection criteria. Body iron load was estimated by serum ferritin level. The study sample consisted of 43 male and 21 female TDT patients, with a mean age of 25.5 years. Most of the patients (43.8%) had serum ferritin level in between 1000-2500 ng/ml. Sixteen (25%) patients had serum ferritin >5000 ng/ml and 3 patients (4.7%) had serum ferritin in between 1000-2500 ng/ml. The mean serum ferritin was found 2462.6 ± 2792.7 ng/ml with a range from 207.0 -11891.2 ng/ml.

Key words: TDT, Serum ferritin.
Materials and Methods

This was a cross sectional observational study, conducted in the Department of Haematology, BSMMU from April 2018 to September 2019. Sixty four diagnosed transfusion dependent Thalassaemia patients were enrolled following selection criteria. All patients were interviewed by a structured questionnaire. Blood sample (5ml) was collected, and serum was separated from each patient and was analysed for Serum ferritin. Informed consent was taken from the subjects. Ethical issues were addressed to every patient. Quality assurance measures were taken. All data were checked after collection. Then the data were entered into the computer and statistical analysis of the results were obtained by using windows-based computer software devised with Statistical Packages for Social Science (SPSS-24).

Results

In this study body iron load was measured by serum ferritin level. Of the 64 study participants highest number, that is 28 patients (43.8%) patients had serum ferritin level in between 1000-2500 ng/ml. Twelve patients (18.7%) had serum ferritin level >5000 ng/ml and 3 patients (4.7%) had serum ferritin in between 2501-5000 ng/ml. Sixteen (25%) patients had serum ferritin level in between 301-1000 ng/ml and 5 patient had serum ferritin ≤300 ng/ml. The mean ±SD serum ferritin was found 2462.6 ± 2792.7ng/ml with a range from 207.0 -11891.2ng/ml (Table I).

Table I: Distribution of the study population according to serum ferritin (n = 64)

<table>
<thead>
<tr>
<th>Serum ferritin (ng/ml)</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤300</td>
<td>5</td>
<td>7.8</td>
</tr>
<tr>
<td>301-1000</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>1000-2500</td>
<td>28</td>
<td>43.8</td>
</tr>
<tr>
<td>2501-5000</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>&gt;5000</td>
<td>12</td>
<td>18.7</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>2462.6 ± 2792.7</td>
<td></td>
</tr>
<tr>
<td>Range (min-max)</td>
<td>207.0 - 11891.2</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Each unit of red cell concentrate (RCC) contains approximately 200 milligrams of iron. Patient who received 100 units of RCC, around 20 grams of iron is entered into his or her body. As without iron chelation therapy iron is trapped into the body, so iron overload develops. Iron overload can be measured by serum ferritin level. The mean ±SD serum ferritin was found to be 2462.6±2792.7 ng/ml with a range from 207.0 to 11891.2 ng/ml. Similar study was conducted by Valizadeh et al. (2014) where they showed the mean ±SD serum ferritin level was 1421.1±371.8 ng/mL. In a study done by Singh et al. (2014) higher mean ±SD serum ferritin level (5295±2736 ng/mL) was found. Meena et al. (2015) observed in their study the mean ±SD serum ferritin value of the thalassaemia patients was 3349 ± 2012.9ng/mL (ranging from 1082 to 9002 ng/mL).

Several studies have reported a lack of concordance of ferritin concentrations with the organ function status. This may be, in part, due to the fact that serum ferritin levels increase linearly with the transfusion load up to 100 units of transfused blood, but thereafter there is no simple relationship. Also, misleading ferritin levels can occur with chronic inflammatory disease as well as vitamin C deficiency. Other factors which could damage endocrine organs in patients of TDT include hypoxia (due to anaemia) and liver dysfunction, as metabolism of various hormones are altered once the liver is damaged. According to Thalassaemia International Federation (TIF) guidelines for TDT management, target for serum ferritin is <1000 ng/mL. But most of our TDT patients have serum ferritin above this level. As a result, TDT patients develop iron overload related complications. The use of iron chelation therapy since the 1970s has increased patients’ life expectancy and delayed complications related to iron overload.
Conclusion
Serum ferritin is a cheap, non-invasive, and available marker of body iron overload.

Reference