ESTIMATION OF HEMOGLOBIN AND SERUM FERRITIN CONCENTRATION FROM FEMALES WITH CHRONIC PERIODONTITIS BEFORE AND AFTER NON-SURGICAL PERIODONTAL THERAPY: AN INTERVENTIONAL STUDY


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ABSTRACT

Oral cavity is the mirror of health and disease. In India, anemia is a common and serious health disorder. Ferritin plays a crucial role in host immune response and elevated ferritin levels may be associated with chronic periodontitis. The aim of this study was to measure the concentration of Hb and serum ferritin from female patients with chronic periodontitis before and after NSPT and to test whether these concentrations correlate with clinical parameters associated with periodontal disease. Under aseptic conditions, 5ml of venous blood was drawn from antecubital fossa of 20 female patients. Hb and serum ferritin levels were estimated by using hemoglobinometer and ELICA respectively. The clinical parameters like BOP, PD, CAL, PI, GI showed statistically significant differences from baseline to 2 months after NSPT. At the end of 2 months there was an considerable increase in Hb when compared to serum ferritin levels. A strong positive correlation was found between GI, Hb, and serum ferritin levels in female chronic periodontitis patients.

INTRODUCTION

Anemia could be a major public health problem worldwide. Anemia is outlined as a hemoglobin level of less than 13 g/DL in men and less than 12 g/DL in women. The premise of this definition is the average hemoglobin level of healthy individuals. According to the World Health Organization, there are 2 billion people with anemia in the world. Among them 42% women with age group 15–59 years are anemic in developing countries and 55.3% in India. These incredible figures have important economic and health consequences for low- and middle-income countries.

Periodontitis is an inflammatory disease of the supporting tissues of the tooth caused by specific microorganisms in a susceptible host. Chronic periodontitis is the most common form of periodontal disease, which progresses relatively slowly and is more common in adults. Just as the periodontal tissues mount an immune inflammatory response to bacteria and their products, systemic challenges with these agents induce a major vascular response (Pradeep et al., 2011).

It is, therefore, speculated that periodontitis results in low-grade systemic inflammation, which may cause lower number of erythrocytes and, consequently, lower hemoglobin concentration (Naik V et al., 2010; Hutter et al., 2002). The serum levels of acute phase proteins changes in patients with chronic periodontitis. (Slade et al., 2000; Megson et al., 2010; Chakraborty et al., 2014, Harshavardhana et al., 2013). Acute-phase proteins (APP) are defined as proteins whose serum concentration is altered at least 25% in response to inflammation and includes proteins of the complement, coagulation and fibrinolytic system, antiproteases, transport proteins, inflammatory mediators and others. (Linden et al., 2008)

Ferritin is a major iron storage protein in the body. It has a protein shell with a core containing iron in ferric form. The blood level of ferritin serves as an indicator of the amount of iron stored in the body. Normal serum ferritin level in Women is about 18-160 mcg/L. When ferritin levels are too high, this can be indicative of an iron storage disorder, a chronic inflammatory condition such as liver disease or rheumatoid arthritis, or some kinds of cancer and Low levels of ferritin are seen in iron deficiency.
In analogue to these observations, the authors anticipate that elevated serum ferritin and hemoglobin levels may be associated with chronic periodontitis, and changes in their levels may be reflected in response to periodontal therapy. Hence study was conducted with an objective to measure the concentration of hemoglobin and serum ferritin from females with chronic periodontitis before and after non-surgical periodontal therapy and to test whether these concentrations correlate with clinical parameters associated with periodontal disease.

**METHODOLOGY**

Study design was Interventional in nature. Patients who reported to the Department of Periodontology, FDS, RUAS, Bangalore were included. Duration of the study was planned for 2 months with power of study 80%, beta error of 5% sample size was estimated as 20 patients with chronic periodontitis.

**Inclusion criteria**

- Female patients between the age group of 25 - 45 years were enrolled.
- Patients diagnosed with chronic periodontitis with pocket depth ≥ 5 mm; bleeding on probing; clinical attachment loss ≤ - 2 mm.
- Gingival index score of ≥ 1.

**Exclusion criteria**

- Patient with history of any systemic diseases.
- Smokers.
- History of periodontal treatment in previous 6 months.
- Pregnant or lactating females.
- Who used antibiotic or other drugs that affect periodontal status in past 6 months.
- Regularly using vitamin supplements within 3 months.

**Method of collecting data**

1. **Clinical parameters like BOP, PD, CAL, GI** were measured using UNC-15 probe.
2. **After that under aseptic conditions 5 ml of venous blood was drawn from antecubital fossa of all patients participated in the study.**
3. **Then collected blood samples were stored in test tubes.**
4. **Collected blood was divided into 2 parts**
   - 1\textsuperscript{st} part is transferred to sterile vacuum tubes containing EDTA for hemoglobin estimation
   - 2\textsuperscript{nd} part was kept at room temperature for 2 hours, Electrochemiluminescence immunoassay (ECLIA) was used for identifying serum ferritin levels
5. **After recording all the clinical parameters and collecting blood, interivension phase was performed which included Non surgical periodontal therapy (SRP), carried out for all patients. After 2 months, concentration of HB, serum ferritin levels were re-assessed and clinical parameters were measured.**
6. **Readings obtained after immunoassay PD measurement after 2 months**
**RESULTS**

Table 1 shows decrease in serum ferritin levels from baseline to 2 months was seen when comparison of clinical parameters scores with Hb and ferritin levels were assessed by Karl Pearson’s correlation coefficient method. The level of significance was set at P<0.05.

**Table 1** Correlation between clinical parameters scores with Hb levels by Karl Pearson’s correlation coefficient method (baseline and 2months)

<table>
<thead>
<tr>
<th>Clinical parameters</th>
<th>Time points</th>
<th>Correlation between baseline Hb levels with Serum ferritin baseline levels</th>
<th>Correlation between 2months Hb levels with Serum ferritin baseline levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOP</td>
<td>Baseline</td>
<td>t-value 0.1908,  p-value 0.8739*</td>
<td>t-value 0.1908,  p-value 0.8739*</td>
</tr>
<tr>
<td></td>
<td>2 months</td>
<td>t-value 0.1908,  p-value 0.8739*</td>
<td>t-value 0.1908,  p-value 0.8739*</td>
</tr>
<tr>
<td>PFQ</td>
<td>Baseline</td>
<td>t-value 0.1908,  p-value 0.8739*</td>
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<tr>
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<td>Baseline</td>
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</tr>
<tr>
<td>GI</td>
<td>Baseline</td>
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</tr>
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</table>

Table 1 represents a statistically significant reduction in GI from baseline to 2 months was seen when comparison of clinical parameters scores was done with Hb levels.

Table 2 shows decrease in serum ferritin levels with GI when compared with clinical parameters from baseline to 2months.

**Table 2** Correlation between clinical parameters scores with serum ferritin levels by Karl Pearson’s correlation coefficient method (baseline and 2months)

<table>
<thead>
<tr>
<th>Clinical parameters</th>
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<th>Correlation between 2months Serum ferritin levels with Serum ferritin baseline levels</th>
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**DISCUSSION**

In chronic periodontitis patients, inhibition of erythropoietin and the hormone responsible for erythropoesis was also seen. This led to decrease in RBC count according to Goldberg (1992). Inflammatory mediators that are increased during periodontitis are shown to suppress mature erythroid progenitor and inhibits erythroid colony forming units from normal human marrow as stated by Maury (1988), Young (1984).

In the present study, results showed statistically significant improvement in all the clinical parameters, increase in Hb levels and decrease in serum ferritin levels were observed after Non-surgical periodontal therapy, in females, at 2 months. Pradeep and Anuj (2011) stated that Chronic periodontitis may tend toward anemia and provides evidence that nonsurgical periodontal treatment can improve the anemic status of patients with chronic periodontitis and that improvement in hematologic parameters were greater in female subjects.

In the present study, after NSPT a statistically significant increase in Hb concentration in the study group was observed. This is in accordance to a studies conducted by Hutter (2001), Gokhale (2010), Naik (2010), Pradeep (2011). In contrast to the results obtained from the present study, Wakai and Poulsen (2006) failed to show any association between hemoglobin levels and periodontal status.

In the present study, statistically significant decrease in serum ferritin levels were observed after NSPT, in females, at 2 months. Souvik Chakraborty et al. (2013) showed raise in serum ferritin levels in patients with CP and decrease to control levels after post-treatment. With the results of this study, It is conceivable that the NSPT improved periodontal inflammation and caused a decrease in serum ferritin levels after therapy.

**CONCLUSION**

A correlation was found between clinical parameters variation, decrease in serum ferritin levels and increase in hemoglobin levels suggesting that anemia is induced by inflammation caused in females with periodontal disease. The study also provides evidence that Non-surgical periodontal therapy can improve the anemic status of the patients. However, further
longitudinal studies with a larger sample size are warranted to ascertain the same.

References


