



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 9, pp. 20276-20279, September, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

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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DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0809.0863>

ARTICLE INFO

Article History:

Received 06th June, 2017
Received in revised form 14th July, 2017
Accepted 23rd August, 2017
Published online 28th September, 2017

Key Words:

Serum ferritin, ELICA, Hemoglobinometer, Hemoglobin, Chronic Periodontitis, Non-surgical periodontal therapy

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 statically 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.

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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.

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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 2months 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



Clinical parameters like BOP, PD, CAL, GI were measured using UNC-15 probe.



After that under aseptic conditions 5ml of venous blood was drawn from antecubital fossa of all patients participated in the study.



Then collected blood samples were stored in test tubes.

Collected blood was divided into 2 parts

1st part is transferred to sterile vacuum tubes containing EDTA for hemoglobin estimation

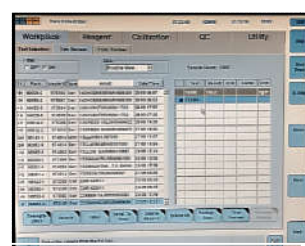
2nd part was kept at room temperature for 2hours, Electrochemiluminescence immunoassay (ELICA) was used for identifying serum ferritin levels



Ferritin level estimation by using Sandwich principle with total duration of assay being 18minutes.



After recording all the clinical parameters and collecting blood, intervention phase was performed which included Non surgical periodontal therapy (SRP), carried out for all patients. After 2months, concentration of Hb, serum ferritin levels were re-assessed and clinical parameters were measured.



Readings obtained after immunoassay



PD measurement after 2months

Statistical Analysis

Data was entered into an Excel, The database was subsequently locked, imported into Statistical Package for Social Sciences (SPSS) for Windows, formatted, and analyzed. Indicators of descriptive statistics were used, such as frequencies, percentage, average, variance, and standard deviation. The Statistical Analysis was done using SPSS v.22 software IBM., Corp. The mean difference in the Bleeding on probing, pocket depth, CAL, Hemoglobin and ferritin levels obtained from the study group was analyzed using Student paired t test. The Correlation between clinical parameters scores with Hb and ferritin levels were assessed by Karl Pearson's correlation coefficient method. The level of significance was set at $P < 0.05$.

RESULTS

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

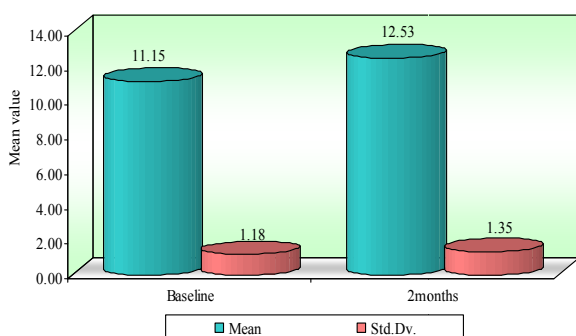
Clinical parameters	Time points	Correlation between baseline Hb levels with			Correlation between 2months Hb levels with		
		r-value	t-value	p-value	r-value	t-value	p-value
BOP	Baseline	-0.1480	-0.5294	0.5987	0.0384	0.1386	0.8919
	2months	0.3229	1.2300	0.2405	0.3203	1.2192	0.2444
PPD	Baseline	0.1190	0.4321	0.6727	0.1197	0.4346	0.6709
	2months	0.0696	0.2515	0.8053	0.0742	0.2682	0.7928
CAL	Baseline	0.1678	0.6137	0.5500	0.1950	0.7168	0.4862
	2months	-0.2389	-0.8872	0.3911	-0.0965	-0.3496	0.7322
GI	Baseline	-0.5159	-2.1716	0.0490*	-0.4870	-1.9836	0.0388*
	2months	-0.3827	-1.4934	0.0159*	-0.2510	-0.9350	0.0366*

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

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

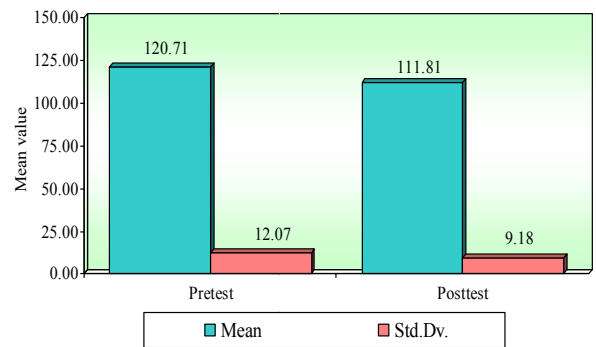
Clinical parameters	Time points	Correlation between baseline Serum ferritin levels with			Correlation between 2months Serum ferritin levels with		
		r-value	t-value	p-value	r-value	t-value	p-value
BOP	Baseline	-0.1962	-0.7213	0.4835	0.1232	0.4478	0.6617
	2months	0.2943	1.1103	0.2870	0.3188	1.2126	0.2468
PPD	Baseline	0.1049	0.3802	0.7099	0.0927	0.3355	0.7426
	2months	0.0725	0.2621	0.7973	-0.0408	-0.1472	0.8852
CAL	Baseline	0.3253	1.2402	0.2368	0.1700	0.6221	0.5446
	2months	-0.0997	-0.3612	0.7238	-0.1277	-0.4641	0.6502
GI	Baseline	-0.5062	-2.1160	0.0542*	-0.5443	-2.3393	0.0359*
	2months	-0.3623	-1.4016	0.0384*	-0.2939	-1.1085	0.2287*

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



Graph1 Comparison of Hb scores from baseline to 2months by paired t test

Statically significant increase in Hb levels were observed from baseline to 2 months in graph 1.



Graph 2 Comparison of serum ferritin scores from baseline to 2months by paired t test

Graph 2 represents a statically significant decrease in ferritin levels were observed from baseline to 2 months.

DISCUSSION

In chronic periodontitis patients, inhibition of erythropoietin and the hormone responsible for erythropoiesis 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 et al \(2011\)](#) 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 et al \(2006\)](#) 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.

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How to cite this article:

Bhavya.B., Ashwini.S and Shruthi.K.R.2017, Estimation of Hemoglobin And Serum Ferritin Concentration From Females With Chronic Periodontitis Before and After Non-Surgical Periodontal Therapy: An Interventional Study. *Int J Recent Sci Res.* 8(9), pp. 20276-20279. DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0809.0863>
