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Research Article

COMPARISON OF SERUM ERYTHROPOIETIN LEVELS IN GINGIVITIS AND PERIODONTITIS SUBJECTS: A BIOCHEMICAL STUDY

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ABSTRACT

Aim & Objective: To compare the serum erythropoietin levels in subjects with generalized chronic gingivitis and generalized chronic periodontitis and to assess the anemic status in subjects with periodontitis. **Materials & Methods:** A total of 30 subjects with generalized chronic gingivitis (n=15) and generalized chronic periodontitis (n=15) participated in the study. Clinical parameters such as plaque index (PI), gingival index (GI), Probing depth (PD), Clinical attachment level (CAL) were assessed. For all these subjects, 2ml of venous blood samples were collected from antecubital fossa by a standard venepuncture method under aseptic conditions and assessed for the levels of Hemoglobin (Hb) and Erythropoietin (Epo) levels. **Results:** Clinical parameters were elevated in group-II (GCP) compared to group-I (GCG). Epo levels varied considerably between the two groups. Higher values of Epo were seen in Group II with Epo value- 53.132 mIU/ml compared to group-I with Epo value- 39.10 mIU/ml. The haemoglobin levels in subjects with GCG was 11.48 gm% and in subjects with GCP was 10.99 gm%. **Conclusion:** Erythropoietin is an important marker of periodontal disease and aids to assess the anemic status in subjects with periodontitis.

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INTRODUCTION

Periodontitis is an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or a group of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth formation, gingival recession or both.^[1] Blood is considered as an ultimate body fluid which indicate the disease process. Anemia of chronic disease (ACD) is usually defined as the anemia occurring in chronic infectious, inflammatory disorders, or neoplastic disorders that are not due to marrow replacement by tumor, bleeding, or hemolysis. Causes for diminished marrow responses in ACD are reduced production of erythropoietin (Epo) or impaired bone marrow response to Epo. EPO is a hormone produced by the kidney that promotes the formation of red blood cells in the bone marrow.^[2] Lower EPO levels have been seen with anemia associated with chronic inflammatory conditions such as rheumatoid arthritis, chronic renal failure, acquired immunodeficiency syndrome, cancer, ulcerative colitis, sickle cell disease, and in premature neonates. Periodontitis like other chronic inflammatory conditions thus can contribute to the prevalence of anemic status due to suppression of

erythropoiesis by inflammatory cytokines. The main aim of the present study to compare the serum erythropoietin levels in subjects with generalized chronic gingivitis and generalized chronic periodontitis and to assess the anemic status in subjects with periodontitis.

MATERIALS AND METHODS

All subjects who took part in this study were explained about the study and written informed consent was obtained from each of them. A total of 30 subjects aged between the age group of 20-60 years of both the genders with generalized chronic gingivitis (n=15) and generalized chronic periodontitis (n=15) were recruited from the outpatients visiting the Department of the Periodontics, K.S.R. Institute of Dental Science and Research, Tiruchengode, Tamil Nadu.

Inclusion criteria to participate in the study is as follows

1. Age between 20-60 years
2. Minimum 20 teeth
3. Probing pocket depth (PPD) \geq 5mm in $>$ 30% of the sites
4. Clinical attachment level (CAL) $>$ 1mm with radiographic evidence of bone loss.

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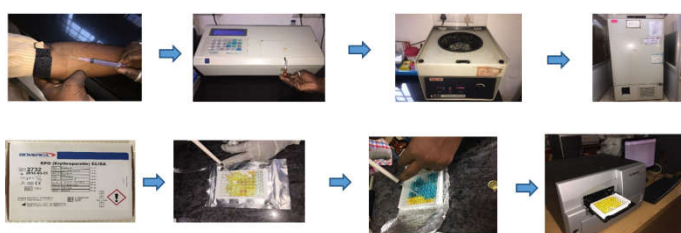
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Exclusion criteria were as follows

1. Pregnant and lactating woman
2. Smokers and pan chewers
3. Patients with a history of systemic diseases
4. Patients who had undergone periodontal treatment in the past 6 months.
5. Patients who had taken antibiotics for the last 3 months.

Clinical measurements

A complete oral examination of the patient was done and clinical parameters like plaque index (Loe in 1967), gingival index (Loe in 1967), probing depth (PD) and clinical attachment level (CAL) were measured and recorded by a trained investigator. Probing pocket depth (PD) was measured from free gingival margin to the base of the pokcet and clinical attachment level (CAL) was measured from the CEJ to the base of the pocket using William’s periodontal probe.



Blood sampling & Epo analysis

After baseline measurements, 2 ml of venous blood was obtained under aseptic conditions by standard venipuncture method from antecubital fossa and allowed to clot between 2°C and 8°C. Assessment of hemoglobin was done. Serum was separated and centrifuged at 4000 rpm and samples were stored at -15°C or lower. Serum samples were then assessed by enzyme-linked immunosorbent assay kit for Epo. Serum samples were stored up to 24 h at 2–8°C until transportation to the laboratory.

Statistical Analysis

Statistical analysis of collected data was done. The results were represented in text, tables and figures.

RESULTS

Figure.1 shows the plaque index scores of both the groups. The plaque index score was higher for subjects with GCP (1.95) compared to subjects with GCG (1.332). Figure.2 represents the correlation of gingival index between both the groups and was found that the GI score was greater in subjects with GCP (1.86) than in subjects with GCG (1.33). Figure.3 represents the probing depth between both the groups. Probing depth was higher in subjects with GCP (2.98) compared to subjects with GCG (2.09). Figure.4 represents the correlation of haemoglobin between the groups and was found that the Hb levels were significantly higher in subjects with GCG (11.48) compared to subjects with GCP (10.89). Figure.5 represents the correlation of Epo levels between both the groups. The Epo levels was higher the subjects with GCP (53.13) compared to subject with GCG (39.10).

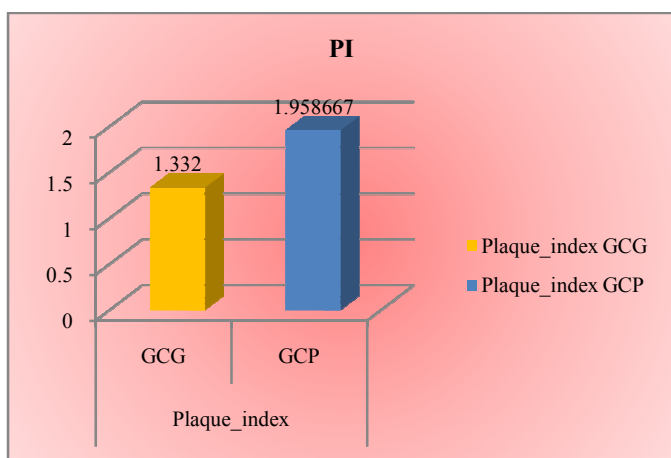


Fig 1 Correlation of plaque index between the groups

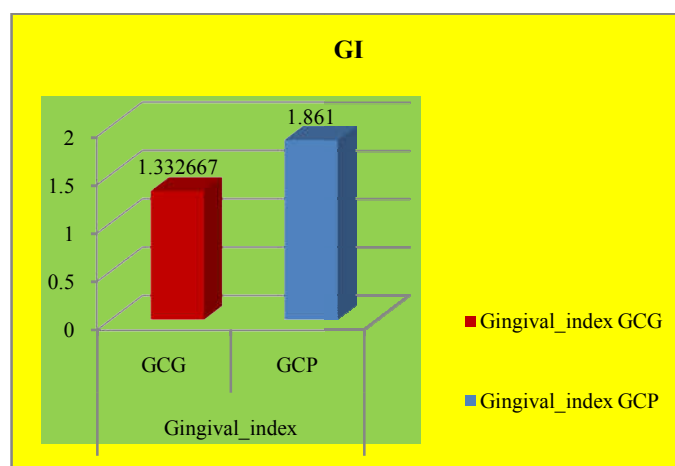


Fig 2 Correlation of gingival index between the groups

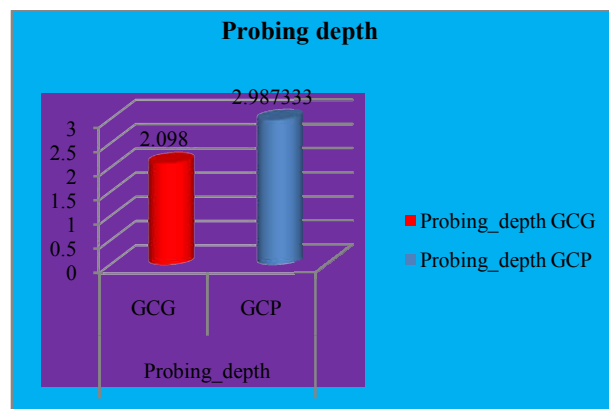


Fig 3 Correlation of probing depth between the groups

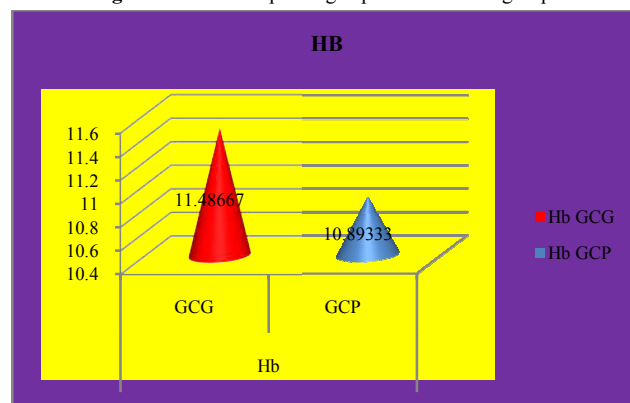


Fig 4 Correlation of hemoglobin levels between the groups

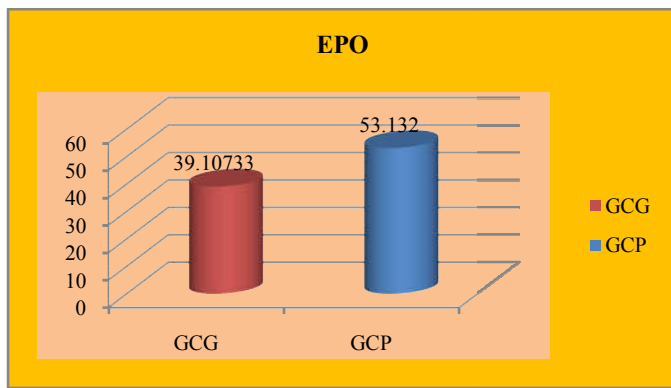


Fig 5 Correlation of Erythropoietin levels between the groups

DISCUSSION

This study compares the levels of serum erythropoietin levels in subjects with gingivitis and periodontitis. In subjects with GCG, the levels of Hb and Epo are within the reference range whereas in subjects with GCP, a decrease in the levels of Hb and an increase in the levels of Epo is noted. In periodontitis, there is increased production of inflammatory cytokines which may inhibit erythropoiesis and stimulate Epo production to compensate for decreased cell mass. Periodontitis being a chronic inflammatory disease can contribute to the anemic status of the patient.

There have been studies which evaluated the prevalence of anemic status in periodontitis. Gokhale *et al.*^[3] found that the percentage of patients who were anemic in terms of Hb was 16.7% in the test group (periodontitis) compared to 3.3% in control group (without periodontitis). Chawla *et al.*^[4] also suggested that anemia is an important factor in the etiology or pathogenesis of periodontal disease. Hutter *et al.*^[5] evaluated the blood parameters in patients with CP and concluded that these patients show signs of anemia. In their study, the number of erythrocytes and hemoglobin were significantly lower in moderate and severe periodontitis than in controls ($P \leq 0.001$, $P \leq 0.001$ and $P \leq 0.002$, respectively)

Cigarette smoking is known to cause an increase in Hb concentration mediated by exposure to carbon monoxide which binds to Hb to form carboxyhemoglobin, an inactive form of Hb with no oxygen carrying capacity.

As compensation, smokers maintain a higher Hb level than nonsmokers. ElZayadi^[6] stated that hypoxia contributes to the development of secondary polycythemia and in turn to increased red cell mass and turnover. He also found that among smokers, those who have slightly higher Hb concentration have a significantly higher serum Epo than smokers with low Hb concentration. Thus, in smokers with periodontitis it may be difficult to ascertain their anemic levels based only on their Hb% levels, as there may be a combined effect of both periodontitis and smoking on the blood parameters

CONCLUSION

Erythropoietin is an important marker of periodontal disease and aids to assess the anemic status in subjects with periodontitis.

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