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PERIODONTITIS PATIENTS AFTER PERIODONTAL THERAPY - A PROSPECTIVE
CLINICAL STUDY

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Research Article

EVALUATION OF ANEMIA OF CHRONIC DISEASE IN GENERALISED CHRONIC PERIODONTITIS PATIENTS AFTER PERIODONTAL THERAPY - A PROSPECTIVE CLINICAL STUDY

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ABSTRACT

Aim: To study the effect of non surgical periodontal therapy that improve the hemoglobin and Red blood cell count in chronic generalized periodontitis patients and to find out whether chronic periodontitis could lead to anemia.

Settings and Design: prospective clinical study

Material and Methods: After informed consent, one hundred male patients with chronic generalized periodontitis selected for the study. Clinical parameters such as Plaque index, gingival index, Probing depth and Clinical attachment level were recorded using William's periodontal probe on full mouth basis. Serum ferritin level was estimated before non surgical periodontal therapy. The clinical parameters were recorded again at three months after non surgical therapy. Haematological parameters such as Red blood cell count, Haemoglobin concentration, Erythrocyte sedimentation rate and peripheral smear were estimated before and after non surgical periodontal therapy.

Statistical analysis used: The data was statistically analyzed using paired t test and Pearson correlation coefficient test.

Results: Clinical parameters such as Plaque index, Gingival index, Probing depth and Clinical attachment level showed positive correlation with Erythrocyte sedimentation rate and negative correlation with Red blood cell count and Hemoglobin concentration.

Conclusions: This study concludes that red blood cell count and haemoglobin concentration significantly improved and erythrocyte sedimentation rate significantly decreased after non surgical periodontal therapy in chronic generalized periodontitis patients.

INTRODUCTION

Periodontitis is a chronic infection of the supporting tissues of the teeth, and is caused by specific pathogens in susceptible subjects (FIGURE-1). The clinical signs of this infection are periodontal pocket, gingival recession and loss of supporting alveolar bone. The clinical symptoms of this infection include swollen red gingiva, gingival bleeding and suppuration. Ulcerated pocket epithelium around the affected teeth forms the port of entry for the bacteria and their products such as endotoxins (Scannapieco *et al*). Bacteraemia in periodontitis have been demonstrated and the extent is directly related to the severity of inflammation of the periodontal tissues. It has been speculated that periodontitis results in a low grade systemic inflammation. Recently several research groups have demonstrated that periodontitis is associated with elevated numbers of white blood cells and elevated levels of C-reactive protein (Ebersole *et al*). These observations indicate that periodontitis patients may have a subclinical systemic inflammatory reaction. Anaemia of chronic disease (ACD) has been described in the literature, and seems to be one of the most common forms of anaemia observed in clinical medicine (Beutler *et al*). ACD is defined as the anaemia occurring in chronic infections, inflammatory conditions or neoplastic disorders that is not due to marrow deficiencies or other diseases, and occurring despite the presence of adequate iron

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stores and vitamins (Lee *et al*). Rheumatoid arthritis is a good example of a common chronic inflammatory condition associated with ACD (Hansen *et al*, Hutter *et al*) proposed that periodontitis also needs to be considered a chronic disease that may cause lower number of erythrocytes and consequently lower haemoglobin concentration in substantial number of patients. Interventional studies suggest that periodontal treatment improves metabolic control and endothelial function. Hence this interventional study was carried out to evaluate periodontitis as one of the etiological factors leading to anaemia of chronic disease.

MATERIAL AND METHODS

One Hundred male patients, from the outpatient Department of Periodontics, Tamil Nadu Government Dental College and Hospital, Chennai, were included in this study. The clearance from Institutional Ethical committee was obtained prior to the study and the ethical principles as enumerated in the Helsinki declaration were meticulously followed throughout the course of the study. After signing the informed consent in the age group of 35-60 years, males (Agarwal *et al*) with Hemoglobin level ≤ 12gm/dl, Serum ferritin > 30ng/dl (Wians *et al*) were included in the study. Patient with the history of Systemic diseases, Present and past smokers, Prior periodontal treatment ≤ 6 month under immuno-suppressants therapy were excluded from the study.

Periodontal Examination

After a thorough medical history and a signed Informed Consent from the patient the clinical parameters such as plaque index (Loe *et al*), gingival index probing depth and clinical attachment level were recorded **.**Patients with chronic generalized periodontitis, were categorized with the Probing depth ≥ 4mm, and Minimum of 20 teeth (Gokhale *et al*)

Blood Sample Analysis

5 ml of venous blood sample was obtained by venepuncture from ante-cubital fossa for each patient by using disposable syringe with hypodermic 23 Gauge needle without stasis. The collected blood was transported using standardized aseptic technique. Of the 5ml blood, 2.5ml was transferred to a plain vacutainer tube and allowed to clot for 30 minutes and then centrifuged(R-8C Remi laboratory centrifuge for 15 minutes at 3000 rpm to separate the serum. Then 500µL of serum sample was stored at 2-8°C for serum ferritin immunoassay. The remaining 2.5ml was transferred to an EDTA coated vacutainer tube which was later subjected to the estimation of Hemoglobin, Erythrocyte sedimentation rate, Red blood cell count by autoanalyser and peripheral smear study was also carried out.

After the non surgical therapy the patients were placed on maintenance phase for three months on post operative follow up After three months, all the patients were recalled and clinical parameters such as Gingival index (Loe *et al*). Probing depth and Clinical attachment level were recorded. 2ml of blood sample was collected and hematological parameters such as Hemoglobin, Erythrocyte sedimentation rate, Red blood cell count and peripheral smear were also recorded.

Statistical Analysis

The collected data was subjected to statistical analysis through SPSS (statistical Package for social science) for windows (version 17). The Paired t test was used to assess the preoperative and post operative values of clinical parameters such as Gingival index,[11]Probing depth, Clinical attachment level and blood parameters such as Hemoglobin concentration, Red Blood Cell count and Erythrocyte Sedimentation Rate (confidence interval at 95) (degree of freedom at 99).

Table 1 Correlation between Ferritin Levels, Hemoglobin, Esr Levels And Periodontal Parameters (Pre-Operative)

		AGE	FERRITIN	PLAQUE.I	GI-1	PPD-1	CAL-I	RBC-1	HB-1	ESR-1
AGE	Pearson Correlation	1	-.136	.220*	.221*	-.124	-.052	.074	.114	-.003
	Sig. (2-tailed)		.177	.028	.027	.220	.611	.464	.260	.973
	N	100	100	100	100	100	100	100	100	100
FERRITIN	Pearson Correlation	-.136	1	.041	-.207*	-.051	-.053	-.066	-.054	.124
	Sig. (2-tailed)	.177		.683	.038	.616	.598	.516	.591	.218
	N	100	100	100	100	100	100	100	100	100
PLAQUE.I	Pearson Correlation	.220*	.041	1	.492**	.143	.045	-.381**	-.255*	.360**
	Sig. (2-tailed)	.028	.683		.000	.155	.654	.000	.010	.000
	N	100	100	100	100	100	100	100	100	100
GI-1	Pearson Correlation	.221*	-.207*	.492**	1	.224*	.156	-.314**	-.234*	.269**
	Sig. (2-tailed)	.027	.038	.000		.025	.122	.001	.019	.007
	N	100	100	100	100	100	100	100	100	100
PPD-1	Pearson Correlation	-.124	-.051	.143	.224*	1	.809**	-.133	-.069	.069
	Sig. (2-tailed)	.220	.616	.155	.025		.000	.188	.494	.497
	N	100	100	100	100	100	100	100	100	100
CAL-I	Pearson Correlation	-.052	-.053	.045	.156	.809**	1	-.177	-.099	.064
	Sig. (2-tailed)	.611	.598	.654	.122	.000		.078	.326	.527
	N	100	100	100	100	100	100	100	100	100
RBC-1	Pearson Correlation	.074	-.066	-.381**	-.314**	-.133	-.177	1	.804**	-.756**
	Sig. (2-tailed)	.464	.516	.000	.001	.188	.078		.000	.000
	N	100	100	100	100	100	100	100	100	100
HB-1	Pearson Correlation	.114	-.054	-.255*	-.234*	-.069	-.099	.804**	1	-.764**
	Sig. (2-tailed)	.260	.591	.010	.019	.494	.326	.000		.000
	N	100	100	100	100	100	100	100	100	100
ESR-1	Pearson Correlation	-.003	.124	.360**	.269**	.069	.064	-.756**	-.764**	1
	Sig. (2-tailed)	.973	.218	.000	.007	.497	.527	.000	.000	
	N	100	100	100	100	100	100	100	100	100

*Correlation is significant at tthe 0.05 level (2-tailed).

**Correlation is significant at tthe 0.01 level (2-tailed).

Table 2 Correlation between Ferritin Levels, Hemoglobin, Esr Levels And Periodontal Parameters (Post-Operative)

		AGE	FERRITIN	PLAQUE.I	GI-2	PPD-2	CAL-2	RBC-2	HB-2	ESR-2
		1	-.136	.220*	.000	-.010	-.036	.057	.082	-.037
AGE	Pearson Correlation		.177	.028	.999	.918	.723	.572	.418	.715
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		-.136	1	.041	-.178	-.076	-.055	-.047	-.054	.146
FERRITIN	Pearson Correlation	.177		.683	.076	.451	.586	.643	.595	.147
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	
		.220*	.041	1	-.076	.098	.028	-.283**	-.173	.183
PLAQUE.I	Pearson Correlation	.028	.683		.450	.334	.785	.004	.085	.069
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		.000	-.178	-.076	1	.266**	.205*	-.008	-.045	.012
GI-2	Pearson Correlation	.999	.076	.450		.008	.041	.938	.659	.904
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		-.010	-.076	.098	.266**	1	.716**	-.158	-.058	.055
PPD-2	Pearson Correlation	.918	.451	.334	.008		.000	.117	.570	.590
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	
		-.036	-.055	.028	.205*	.716**	1	-.137	-.090	-.002
CAL-2	Pearson Correlation	.723	.586	.785	.041	.000		.175	.376	.985
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		.057	-.047	-.283**	-.008	-.158	-.137	1	.855**	-.735**
RBC-2	Pearson Correlation	.572	.643	.004	.938	.117	.175		.000	.000
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		.082	-.054	-.173	-.045	-.058	-.090	.855**	1	-.757**
HB-2	Pearson Correlation	.418	.595	.085	.659	.570	.376	.000		.000
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100
		-.037	.146	.183	.012	.055	-.002	-.735**	-.757**	1
ESR-2	Pearson Correlation	.715	.147	.069	.904	.590	.985	.000	.000	
	Sig. (2-tailed) N	100	100	100	100	100	100	100	100	100

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation coefficient was used to assess the correlation between clinical parameters such as Gingival index (Loe *et al*), Probing depth, Clinical attachment level and blood parameters such as Hemoglobin concentration, Red Blood Cell count and Erythrocyte Sedimentation Rate preoperatively and post operatively. The mean and standard deviation were calculated at the P value assessed from the standardized table. The values which were highly significant P<0.001 only were considered.

RESULTS

In the present interventional study, hundred male subjects with chronic generalized periodontitis were included with a mean age of 45.Clinical parameters such as Gingival Index (Loe *et al*), Probing depth, and Clinical Attachment Level(Bentley *et al*) were assessed. The hematological parameters such as Hemoglobin concentration, Red Blood Cell count and Erythrocyte Sedimentation Rate were analyzed.

There is a statistically significant decrease in Gingival Index (Loe *et al*), probing depth, Clinical Attachment Level after non-surgical therapy with p value < 0.001. There is a statistically significant increase in Red Blood Cell count, hemoglobin level after non surgical therapy with p value < 0.001. There is a statistically significant decrease in Erythrocyte Sedimentation Rate after non surgical therapy with p value < 0.001. There is a negative correlation of Gingival Index (Loe *et al*) Probing depth and Clinical Attachment Level with blood parameters, such as Red Blood Cell count and Hemoglobin concentration and that there is a positive correlation of Gingival Index, Probing Depth and Clinical Attachment Level with blood parameters of Erythrocyte Sedimentation Rate.

DISCUSSION

The present study was to investigate the hematological status of generalized chronic periodontitis for anemia and subsequently analyze the effect of non surgical therapy on anemia.

The clinical implication of the study by Hutter *et al* was said to be limited because of failure to show the association among non smokers or past smokers (Stoltenberg).Therefore smokers are excluded from the study which is similar to studies done by Agarwal *et al*, Pradeep *et al* and Sneha *et al*. In India, anemia is more prevalent in females because of poor nutrition (Bentley *et al*) increased menstrual loss, high incidence of tropical and intestinal infections and other miscellaneous factors. Females are also prone to hormonal imbalance during puberty during the reproductive phase, and towards menopausal age. The microbial flora and host immune response are altered leading to exaggerated response of the periodontal tissues to the local factors (Amar *et al*).Therefore to eliminate the bias only male patients were included in the present study which is concurrent with studies done by Chawla *et al*, Vidya *et al*, and Sneha *et al* and Gokhale *et al* but in contrast with the study done by Pradeep *et al*, and Hutter *et al*.

Only patients with Serum ferritin above 30ng/ml (Wians *et al*) as well as haemoglobin values ≤12gm/dl were included in the study. An inclusion of patients with serum ferritin level above 30ng/ml (Wians *et al*) was done to exclude patients with pure iron deficiency anaemia which is in agreement with Agarwal *et al* and Vidya *et al*. In our present study there is a negative correlation of Gingival index (Loe *et al*). Probing depth and Clinical attachment level with Haemoglobin and Red Blood Cell count. This is in agreement with studies by Hutter *et al* whereas Havwmousen *et al* failed to show association between haemoglobin and periodontitis which is contrast to our present study. This may be due to acute phase reactants such as C-reactive protein (Ebersole *et al*) and fibrinogen in periodontal inflammation.

The present study shows positive correlation of Gingival index, Probing depth and Clinical attachment level with Erythrocyte Sedimentation Rate. This is concurrent with studies done by Pradeep *et al*, Agarwal *et al* who has shown the same results. After non surgical therapy it shows a mean increase in

haemoglobin level by 0.782 mg/dl (P < 0.001) and a mean increase of 0.4631 million /mm^3 in erythrocyte count on resolution of periodontal inflammation. These changes are in agreement with a previously reported interventional study by Agarwal *et al*. The current study also showed a decrease in ESR values after treatment. This is in agreement with the studies done by Agarwal *et al* and Hutter *et al*. In our present study all the peripheral smears showed normocytic and normochromic which is concurrent with the results shown by Agarwal *et al*. The improvement in the mean haemoglobin levels after therapy in patients with chronic generalized patients

CONCLUSION

This study concludes that red blood cell count and haemoglobin concentration significantly improved and erythrocyte sedimentation rate significantly decreased after non surgical periodontal therapy in chronic generalized periodontitis patients.

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