Asian Pac. J. Health Sci., 2018; 5(3):57-66 e-ISSN: 2349-0659, p-ISSN: 2350-0964

Document heading doi: 10.21276/apjhs.2018.5.3.8 Original Article

Comparative evaluation of osteoprotegerin levels in patient with chronic periodontitis before and after scaling and root planning (A clinico biochemical study)

CK Anil[1*], Pradeep Shukla[2], Prerna Kataria[3] ,Gaurav Mahotra[3], Varun Dahiya[3],Chander Shekar Joshi[1]

[1]Divya Jyoti College of Dental science and Research, Modinagar GZB, UP, India
[2]HOD, Department of Periodontics, Divya Jyoti College of Dental science and Research, Modinagar GZB, UP, India
[3]Professor, Department of Periodontics, Divya Jyoti College of Dental science and Research, Modinagar GZB, UP, India

Received: 15-06-2018 / Revised: 02-07-2018 / Accepted: 28-07-2018

ABSTRACT

Periodontal disease is a chronic bacterial infection characterized by persistent inflammation, connective tissue breakdown, and alveolar bone destruction. The result showed that it shows that scaling and root planing is efficient in reducing the gingival bleeding index scores, Probing Depth and Attachment Loss in chronic periodontitis patients. The study also proved that scaling and root planing was efficient in increasing the OPG scores in chronic periodontitis patients.

Keywords: Adolecent, Reproductive Health, Sexual Heallth, Dans Education.

Introduction

Periodontal disease is a chronic bacterial infection characterized by persistent inflammation, connective tissue breakdown, and alveolar bone destruction. Simonet identified a novel secreted glycoprotein that regulates bone resorption[1]. The protein, termed Osteoprotegerin (OPG), is a novel member of the TNF receptor superfamily and can act as a soluble factor in the regulation of bone mass and imply a utility for OPG a member of the TNF family of cytokines that exists in transmembrane and soluble (cleaved) forms. The discovery of the RANK/RANKL/OPG system in the mid-1990s is of significant importance leading to a better understanding of the signalling system in the Regulation of Bone Metabolism [2,3].

Aims and objectives

The aim of this study is to assess the value of Osteoprotegerin (OPG) in gcf, as an indicator of the severity of periodontal tissues destruction.

**Correspondence*
Dr. C K Anil
Divya Jyoti College of Dental science and Research, Modinagar GZB, UP, India.
E- Mail: drckbanil1515@gmail.com

Materials and methods

The present study was conducted in the Department of Periodontology and Implantology at Divya Jyoti College of Dental sciences and Research, Modinagar on subjects to estimate and compare the levels of Osteoprotegerin (OPG) in the gcf of the chronic periodontitis patients before and after scaling and root planning. A sample size of 50 patients of age group 30-50 years with good systemic health were selected from the OPD. Patients so selected were studied into two groups Group I: Patients with chronic generalized periodontitis before scaling and root planning Group II: Patients after scaling and root planning[4-6].

Inclusion criteria

- Both males and females patients
- Patients aged between 30-50 years
- Patients with minimum of 20 teeth
- Patients with good systemic health and mental health status and Chronic generalized periodontitis patients with presence of moderate to advanced chronic periodontitis. (atleast 7 teeth with periodontal pocket deeper than 6 mm)[7-9].

Exclusion criteria

- Patients having systemic diseases like diabetes mellitus, rheumatoid arthritis, cardiovascular diseases, gastrointestinal disorders, respiratory diseases etc.
- Patients with history of any periodontal surgery in past 6 months.
- Pregnant and lactating females.
- Smokers
- History and/or presence of any other infections.

FOR GCF COLLECTION

1 to 5 µl calibrated volumetric microcapillary pipettes (Sigma Aldrich chemicals company ltd,USA).

· Ependroff tubes

FOR ELISA TEST

Enzyme-linked immunosorbent assay for analysis of Osteoprotegrin (OPG) (Immunoconcept India PVT. LTD.)

ELISA reader

clinical parameters such as modified sulcus bleeding index probing depth and relative attachment level were assessed.GCF sample was collected for 15 seconds by calibrated volumetric microcapillary pipettes and stored at -70°C till the time of assay.Biochemical analysis of GCF samples was done to estimate the level of Osteoprotegrin (OPG) using ELISA kit (BOSTER IMMUNOLEADER HUMAN Osteoprotegrin (OPG) ELISA KIT)[10-12].

Fig 1: Armamentarium (for clinical use)

Fig 2: Armamentarium used for GCF collection

Fig 3: Armamentarium (for GCF collection)

Fig 4: Thermocol box and dry ice for transportation of GCF sample

Fig 5: Deep freezer used to store GCF sample

Fig 6: ELSA kit for human OPG

Fig 7:Microtiter pipettes

Fig 8: Adding samples into microtiter wells

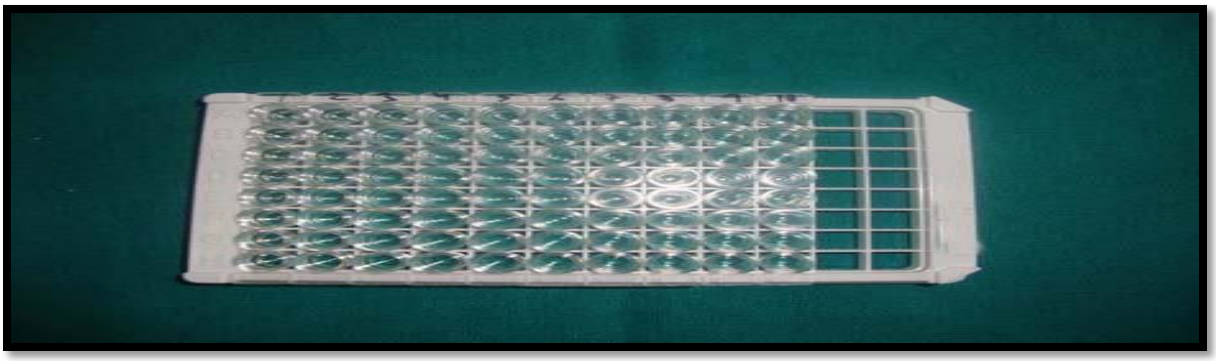

Fig 9: View of microtiter plate after first incubation

Fig 10:Adding anti-human osteoprotegrin (OPG)antibody working solution

Fig 11: Washing the microtiter plate

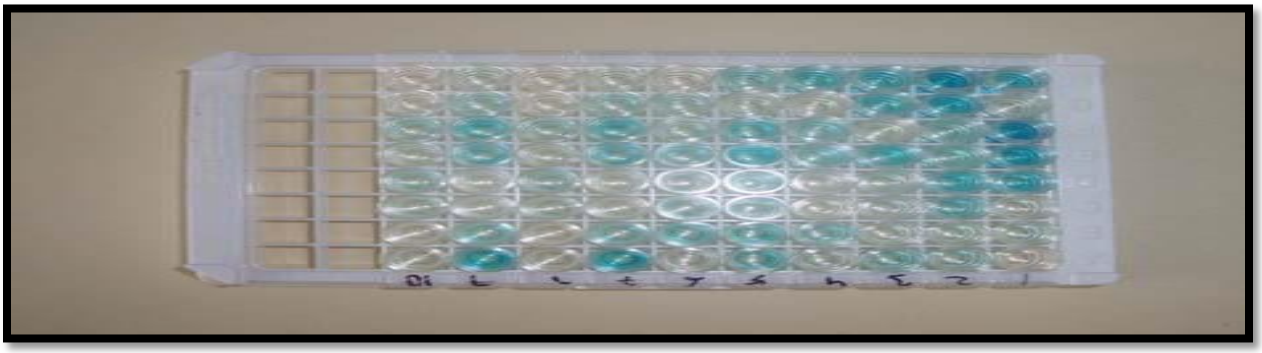

Fig 12: View of microtiter plate

Fig 13:Adding stop solution

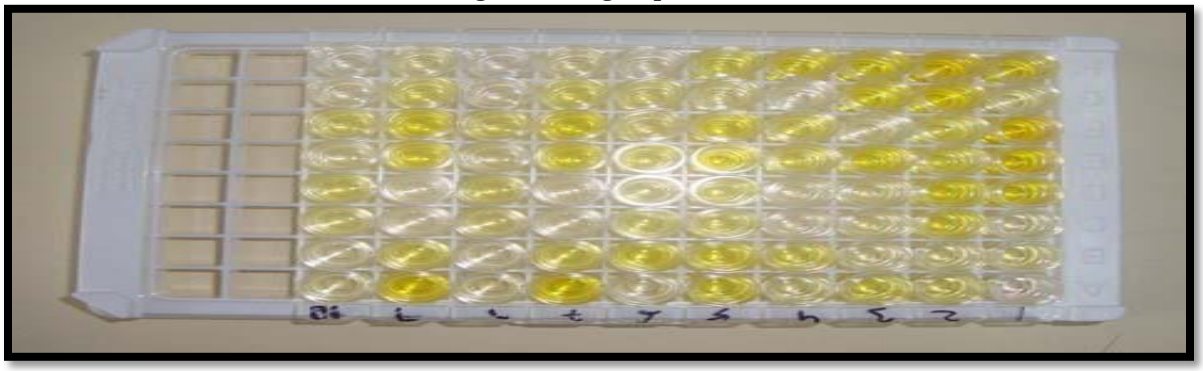

Fig 14:View of microtiter plate after adding stop solution

Fig 15: ELISA reader

Fig 16: Operating on a patient

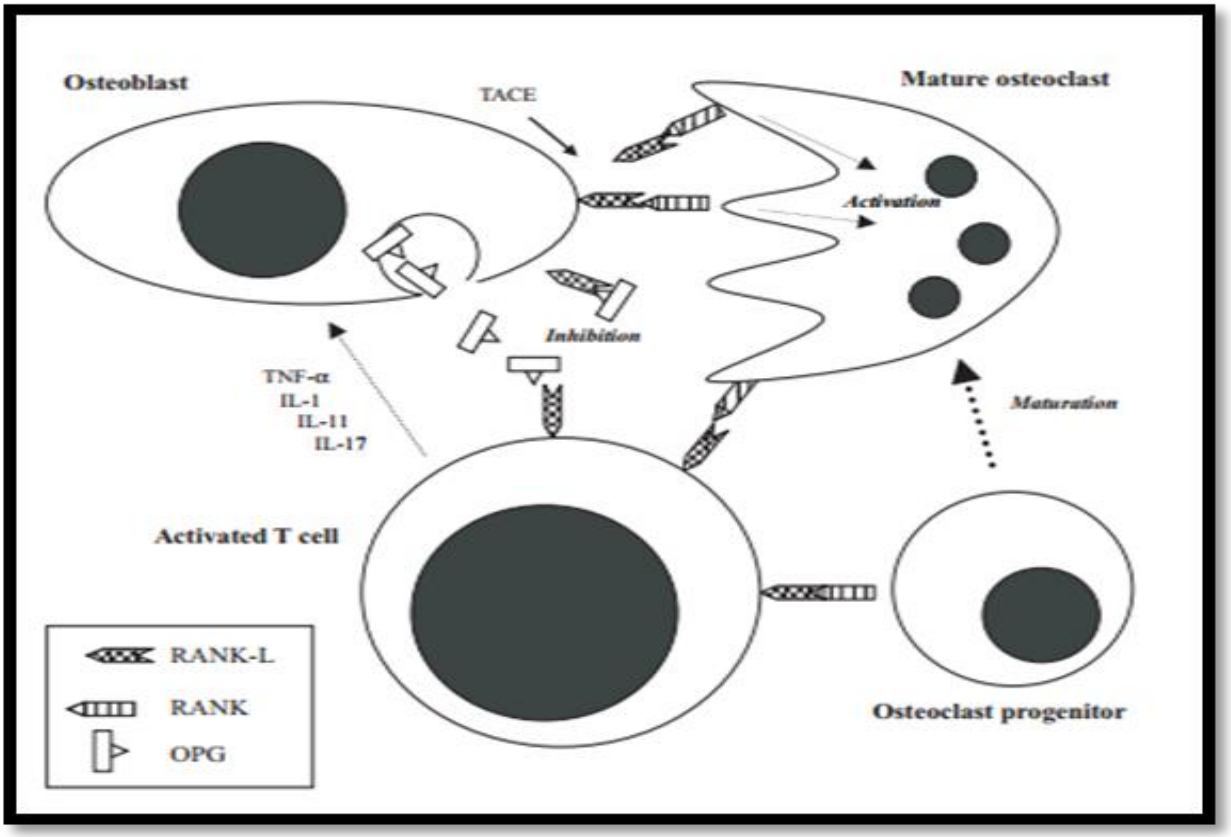

Fig 17: Mechanism

Results

Table 1: Comparison of probing depth between baseline and 2 months period

Gingival bleeding	Baseline	Mean 2.44	N 50	Std deviation 0.33	Std error 0.047	P Value 0.001	Significance Significant
	2 months	0.92	50	0.39	0.055		

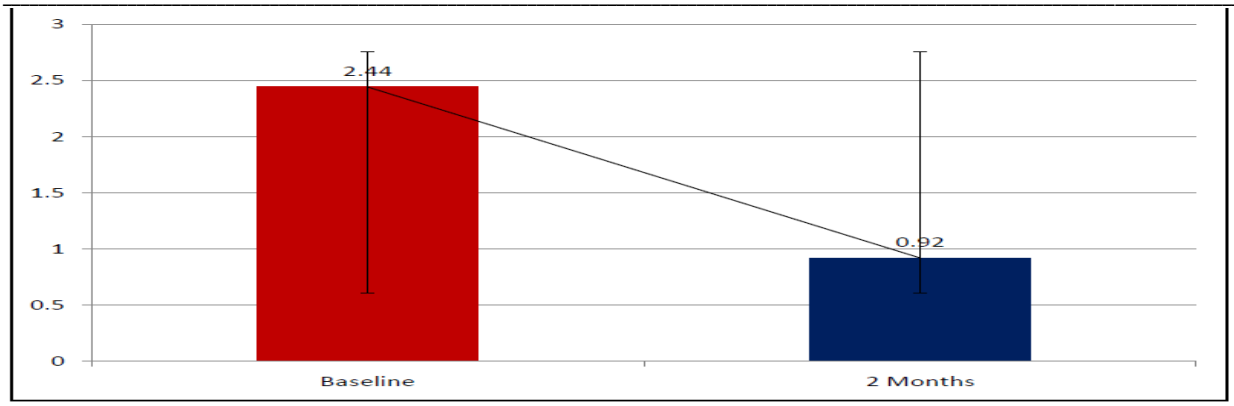

Fig 18: Comparison of gingival bleeding index scores between baseline and 2 months period

Statistically significant difference shows that scaling and root planing is efficient in reducing the gingival bleeding index scores in chronic periodontitis patients.

Table 2: Comparison of gingival bleeding index scores between baseline and 2 months period

Probing depth	**Baseline**	**Mean 6.34**	**N 50**	**Std deviation 0.842**	**Std error mean 0.119**	**P Value 0.001**	**Significance Significant**
	2 months	3.05	50	0.904	0.121		

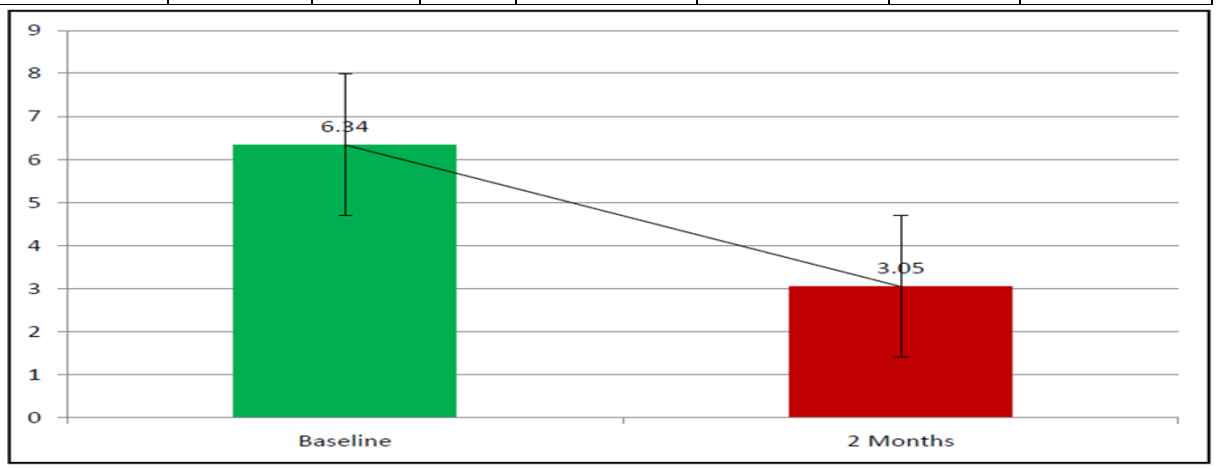

Fig 19: Comparison of probimg depth scores between baseline and 2 month period

Statistically significant difference shows that scaling and root planing is efficient in reducing the Probing Depth in chronic periodontitis patients.

Table 3: comparison of attachment level scores between baseline and 2 months period

Attachment level	**Baseline**	**Mean 5.94**	**N 50**	**Std deviation 0.912**	**Std error mean 0.128**	**P Value 0.001**	**Significance Significant**
	2 months	1.72	50	0.847	0.119		

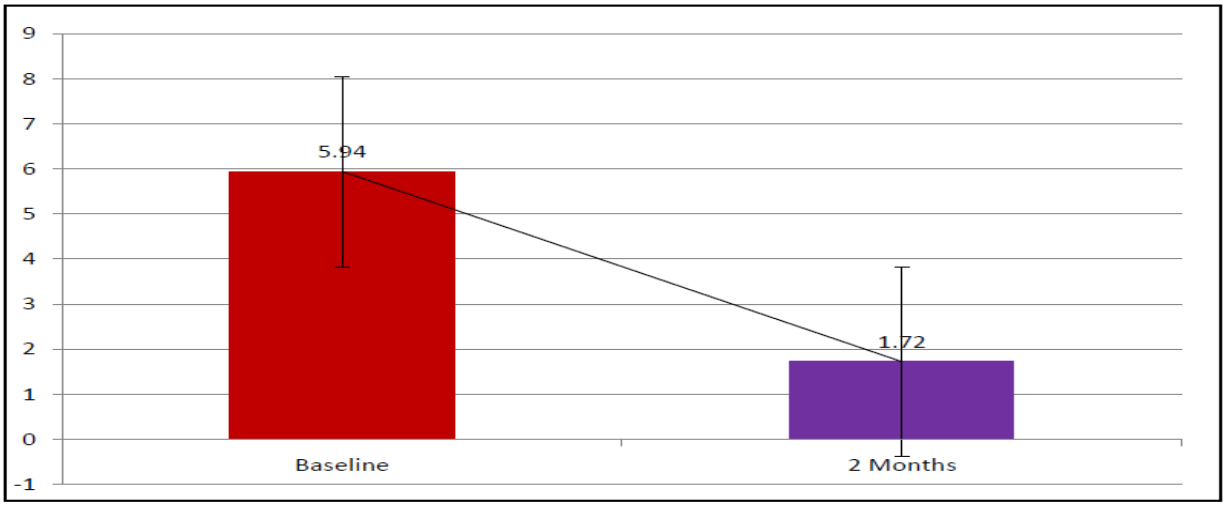

Fig 20: Comparison of attachment level scores between baseline and 2 month period

Statistically significant difference shows that scaling and root planning is efficient in reducing the Attachment Level in chronic periodontitis patients

Table 4: Comparison of opg level between baseline and 2 months period

OPG Level	Baseline	Mean	N	Std deviation	Std error mean	P Value	Significance
		126.30	50	18.19	2.57	0.001	Significant
	2 months	176.62	50	7.07	1.00		

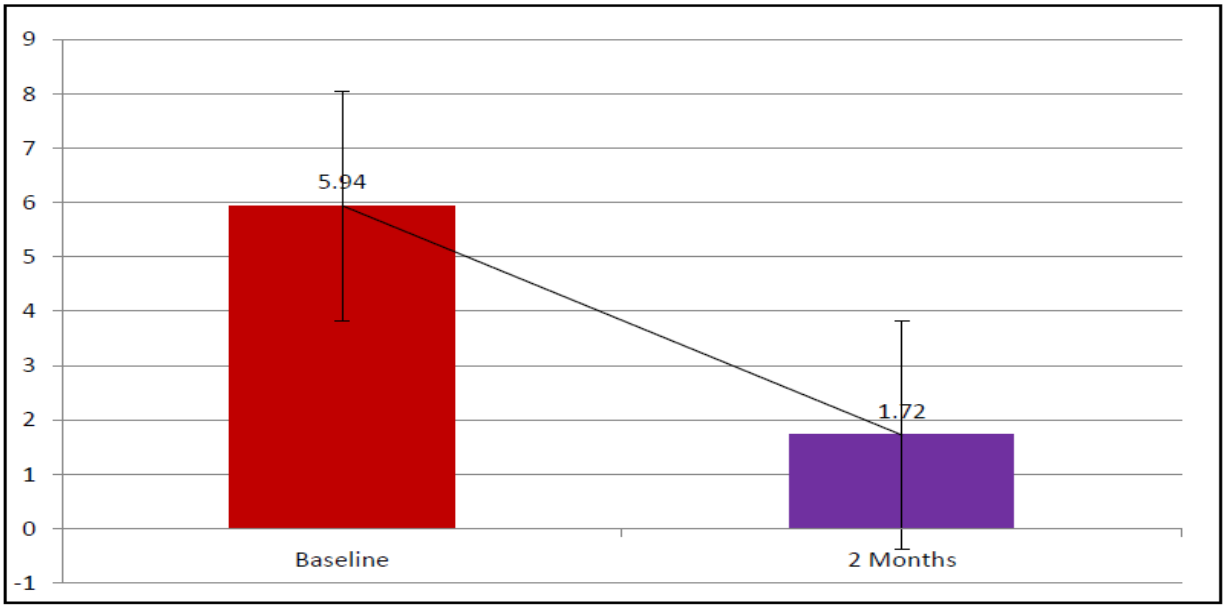

Fig 21: Comparison of attachment level scores between baseline and 2 month period

Statistically significant difference shows that scaling and root planing is efficient in increasing the OPG Level in chronic periodontitis patients.

Discussion

OPG is a novel soluble decoy receptor that has been called the "bone protector" as it protects the skeleton from excessive bone resorption.opg cellular sources are osteoblasts, endothelial cells, fibroblasts, and vascular and smooth muscle cells. Receptor activator of nuclear factor ligand (rankl)is a ligand that belongs to TNF family. It is expressed by osteoblasts, activated T and B cells as well as production is stimulated by cytokines found in the GCF/saliva as a result of inflammation in individuals with periodontal disease. Osteoprotegerin on the other hand is a protein that has structural homology to RANK and is therefore a decoy receptor for RANKL. The ligand (RANKL) preferentially binds to it at the expense of its natural receptor RANK. Once the interaction between the ligand and the receptor is interrupted, differentiation of osteoclasts is prevented with reduction in bone resorption.When OPG concentrations are high, it binds to RANKL, inhibiting RANKL–RANK interaction, thus suppressing the terminal stage of osteoclastic differentiation and activation and blocking osteoclastogenesis.studies has reported similar results for OPG in gingival crevicular fluid (GCF)and saliva. Buduneli et al. evaluated the effects of initial periodontal treatment on GCF levels of IL-17, soluble RANKL, and OPG in smoking and nonsmoking patients with chronic periodontitis. Studies reported that the expression of OPG was found to be decreased, while RANKL was increased in periodontal diseases. Bostanci et al. have shown that RANKL and OPG gene expressions are differentially regulated in gingival tissues depending on the form of periodontal disease, and increased RANKL/OPG expression ratio may indicate the occurrence of periodontitis.

Summary and conclusion

The result showed that it shows that scaling and root planing is efficient in reducing the gingival bleeding index scores, Probing Depth and Attachment Loss in chronic periodontitis patients. The study also proved that scaling and root planing was efficient in increasing the OPG scores in chronic periodontitis patients. Since these parameters showed a positive correlation, it can be concluded that they can be used as predictors for change in OPG level and Osteoprotegerin can be used as a diagnostic marker in chronic periodontitis patients.

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Conflict of Interest: None
Source of Support: Nil