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Lipoxin A_4 as indicator for anti-inflammatory role of platelets rich plasma (PRP) in treatment of chronic periodontitis

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Abstract

Background: Chronic periodontitis is an inflammatory disease that disturbs the associated tissues of the teeth and characterized by degradation of fibrous connective tissue, bone resorption and formation of periodontal pocket. Platelet-rich plasma is one of the newest methods for periodontal treatment. The preparation of platelet-rich plasma from blood is simple, and low cost to achieve natural autologous growth factors and anti-inflammatory effects and because of its capacity to increase the regeneration ability of tissue, platelets rich plasma now broadly used in different fields of medicine.

Aims of platelets rich plasma:

1.to evaluate the anti-inflammatory effect of platelets rich plasma when managed as aide to scaling and root planing as a therapy to chronic periodontitis and compared to the scaling and root planing alone by estimating the serum concentration of lipoxin A_4 and measuring the neutrophils counts and platelets counts .

2. Platelets rich plasma the effect of platelets rich plasma as adjunct to scaling and root planing on readings of clinical periodontal parameters (plaque index, gingival index, bleeding on probing, probing pocket depth and relative attachment level) and compare those findings with scaling and root planing alone.

3. Correlate the findings of clinical periodontal parameters with the anti-inflammatory markers (lipoxin A_4 level, neutrophils count and platelets count)

Materials and methods: forty participants were enrolled in this platelets rich plasma of both genders, all systemically healthy with chronic periodontitis. They divided to (20) subjects as a scaling and root planing group and (20) subjects as platelets rich plasma group. Base line visit was done to all participants in both groups (supragingival scaling and stent construction); then

all were examined at three successive visits, first visit, after two weeks and after one month. At first visit; all clinical periodontal parameters (plaque index, gingival index, bleeding on probing, probing pocket depth and relative attachment level) were recorded for both groups before doing scaling and root planing to the selected sites.

For platelets rich plasma group who treated with platelets rich plasma 10 milliliters venous blood was withdrawn; partly which for preparation of Platelets rich plasma to be re injected at the selected sites. The other parts prepared and stored for subsequent measure of neutrophils counts, platelets counts and lipoxin A_4 level. And for scaling and root planing group 5 mililiters venous blood was withdrawn. This blood was prepared and stored for subsequent measure of neutrophils counts, platelets counts and lipoxin A_4 level.

At the second visit: plaque index and gingival index were recorded for both groups.

At the third visit: all clinical periodontal parameters were re measured for both groups, 4 milliliters venous blood was withdrawn for measure the neutrophils counts, platelets counts and lipoxin A_4 level. Throughout platelets rich plasma every one of the participants was directed and encouraged to keep their oral health in good manner.

Results:

Intragroup comparison: the clinical periodontal parameters: plaque index, gingival index, bleeding on probing, probing pocket depth and relative attachment level in scaling and root planing group showed reduction in median values between the first and third visits as gingival index (1.8 to 1.5) ,Plaque index(0.87 to 0.56) ,Bleeding on probing (87.5 to 56.25) ,Probing pocket depth (4.78 to 4) and Relative attachment level (7.29 to 6.84), similarly the clinical periodontal parameters in platelets rich plasma group also showed reduction in median values between the first and third visits as plaque index(1 to 0.78) ,Gingival index (1.8 to 1.39) ,Bleeding on probing (83.3 to37.5) , Probing

pocket depth (5 to 3.6) and Relative attachment level (8.19 to 7.3). Immunological parameters**: neutrophils count** showed reduction in median values between the first and third visits in scaling and root planing group (5.41 to 4.95) and **platelets count** showed increase in the median value (277 to 281.5) while, in platelets rich plasma group neutrophils count also showed reduction (4.75 to 4.16) and platelets count showed reduction too in median value (243.5 to 235). Median of the lipoxin A_4 level of platelets rich plasma group showed reduction when compared the first visit (0.19) and third visit (0.15) while scaling and root planing group showed no differences between the median values of first visit (0.26) and third visit (0.26).

Intergroup comparison: clinical periodontal parameters: the gingival index showed significant differences while the bleeding on probing showed highly significant differences in the third visit between the scaling and root planning group and platelets rich plasma group , probing pocket depth and relative attachment level showed non-significant differences in the third visit although the reduction in median value in both groups. The results also showed there was statistically non-significant difference in median value of the lipoxin A_4 level between platelets rich plasma group (0.19) and scaling and root planing group (0.26) in first visit but after patients have been followed up for one month the results showed statistically significant difference in median of the lipoxin A_4 level between platelets rich plasma group (0.15) and scaling and root planing group (0.26) in third visit.

Correlation between immunological parameters: in the third visit of platelets rich plasma group; the **neutrophils count** showed positive weak non-significant correlation with **platelets counts** and with **human lipoxin A_4** as well as the **platelets count** showed positive weak non-significant correlation with **human lipoxin A_4**.

Conclusion

The use of platelets rich plasma as aide to scaling and root planing for periodontal pockets reduction have got a positive effects on clinical outcomes in terms of reduction of scores of clinical periodontal parameters as gingival index and bleeding on probing. Also it enhances the tissue response to the treatment by its anti-inflammatory effect, as the reduction in concentration of lipoxin A_4, and reduction in neutrophils count together with platelets count.