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EFFECT OF TWO COMMERCIALLY AVAILABLE CHLORHEXIDINE MOUTHRINSES ON C-REACTIVE PROTEIN LEVELS IN PATIENTS SUFFERING FROM CHRONIC PERIODONTITIS

Rathore Promod Kumar[1], Bhushan Anoop[2], Bali Shweta[3], Salaria Shivani Dadwal[4]

1. Sr. Lecturer, Deptt of Periodontics,Shree Bankey Bihari Dental College, Ghaziabad, U.P, India
2. Ex- Prof and Head, Deptt of Periodontics, Santosh Dental College, Ghaziabad, UP, INDIA
3. Prof and Head, Deptt of Periodontics, Santosh Dental College, Ghaziabad, UP, INDIA
4. MDS- Periodontics, BioMed Research and Analysis, U.P, INDIA

ABSTRACT:

Aim: The aim of the study was to evaluate the effect of different concentrations of Chlorhexidine(CHX) mouthrinses(0.12% & 0.2%) used as an adjunct to non surgical periodontal therapy on the clinical and haematological parameters(CRP) in patient suffering from generalized chronic periodontitis.

Method: Thirty patients were divided into three groups, namely Control group, Test group A and Test group B. All subjects received non surgical periodontal therapy that included oral hygiene instructions and subgingival scaling and root planing. Subjects in test group A and test group B were advised to use CHX mouthrinses(0.12% & 0.2%) respectively along with mechanical plaque control after 1 month of completion of non surgical periodontal therapy. Serum CRP levels and periodontal parameters were recorded for all the patients for all the three groups after one month and two months from base line.

Results: Test group A and B showed that there was statistically significant ($p<.05$) reduction of C-reactive protein (CRP) values which were (19.99 ±19.92, 29.23 ±39.25) respectively when compared to control group(-4.68 ±30.01) at 1 – 2 months duration. Clinical parameters improved more in test group compare to control group.

Conclusions: Chlorhexidine (0.12% &0.2%) mouthrinses used as an adjunct to non surgical periodontal therapy were more helpful in reducing the CRP levels and improved the clinical parameters when compared to non surgical periodontal therapy alone. There were no significant difference observed in term of clinical and haematological efficacy between 0.12% and 0.2% chlorhexidine mouthrinses.

Key Words: Periodontitis, C-reactive protein, non surgical periodontal therapy, chlorhexidine mouthrinses.

INTRODUCTION:

Oral–systemic disease connections have become a major concern because oral infections and conditions may contribute to pathologic processes elsewhere in the body. Poor oral health, attributed primarily to Periodontal disease and associated tooth loss, has been associated with an increased risk for Cardiovascular disease (CVD), Pulmonary diseases, Diabetes, adverse Pregnancy outcomes, and all in turn cause mortality. [1]

*Corresponding Author Address: Dr. Promod Kumar Rathore Email: promod.k.rathore@gmail.com

Periodontitis is a destructive inflammatory disease of the supporting tissues of the teeth. This condition is caused by a chronic, mixed infection of gram-negative bacteria. Periodontal pathogens affect local and systemic immune and inflammatory responses.Treatment of periodontal disease has resulted in reduction in serum CRP levels, improved glycemic control and improved endothelial function. [2]

CRP, named for its capacity to precipitate the somatic C-polysaccharide of Streptococcus pneumoniae, was the first acute-phase protein to be described and is an exquisitely sensitive systemic marker of inflammation and tissue damage. [3]

Periodontal disease is a plaque-induced infection and most patients are not extremely skilled in mechanical plaque removal, professional cleaning is almost universally indicated to sustain long-term stability of the periodontium. [4] Professional cleaning is a critical aspect of non surgical periodontal therapy.

Studies showed that less than half of the plaque is removed, leaving 60% after brushing; this serves as a reservoir that may cause rapid plaque regrowth. For a substantial number of individuals, maintaining an adequate low plaque level through daily toothbrushing is almost impossible. In such cases, an adjunctive plaque-inhibiting product could be useful. Various products for chemical plaque inhibition are available in the market. The bisbiguanide compounds are said to be the most effective agents. Of this group, chlorhexidine (CHX) is a cationic chlorophenyl biguanide with outstanding bacteriostatic properties. [5]

There are 2 commonly used CHX concentrations available: one, 0.2% CHX, which is used with a 10 ml volume and the other 0.12% CHX, which is used with a 15 ml volume. The rationale for lowering the concentration of CHX is to reduce side-effects such as extrinsic staining, transient impairment of taste sensation and burning sensation in mouth etc while maintaining comparable efficacy. [6]

The purpose of this study was not only to reaffirm the effect of non surgical periodontal therapy(NSPT) on CRP reduction levels, thereby reducing or eliminating periodontal inflammation, but also to investigate the effect of different concentrations of CHX mouthrinses(0.12% & 0.2%) used as an adjunct to non surgical periodontal therapy on the clinical and haematological parameter(CRP) in patient suffering from generalized chronic periodontitis.

MATERIALS AND METHODS:

A total of Thirty patients were selected for the proposed study were randomly divided by Lottery system into three groups, namely Control group, Test group A and Test group B. All subjects received non surgical periodontal therapy that included oral hygiene

instructions and subgingival scaling and root planing.

1) Control group – comprised of 10 patients where non surgical periodontal therapy(NSPT) alone was performed and a follow up was done at baseline, 1 month and 2 months respectively.

2) Test group A- comprised of 10 patients where the plaque control was done with chlorhexidine 0.12% mouthrinse as an adjunct after 1 month of non surgical periodontal therapy(NSPT) and a follow-up was done at baseline, 1 month and 2 months respectively.

3) Test group B- comprised of 10 patients where the plaque control was done with chlorhexidine 0.2% mouthrinse as an adjunct after 1 month of non surgical periodontal therapy(NSPT) and a follow-up was done at baseline, 1 month and 2 months respectively.

Inclusion criteria

(i) Age 30 - 50 yrs.

(ii) Patients diagnosed with chronic generalized periodontitis.

(iii) Probing depth of ≥ 4mm and clinical attachment loss ≥ 5mm respectively.

(iv) Radiographic evidence showing horizontal bone loss.

(v) Patient should be cooperative and ready to follow the oral hygiene instruction.

Exclusion criteria

(i) Systemic diseases or medication and treatment possibly affecting the healing process, e.g. diabetes(regardless of control)

(ii) Pregnancy.

(iii) Smokers.

(iv) Allergic to chlorhexidine

Clinical and hematological parameters were assessed at baseline, after 1 month of completion of non surgical periodontal therapy(NSPT) and after 2 months for subjects in all the 3 groups.

Clinical parameters assessed for the study included Plaque index, Gingival index, Probing Pocket depth and Clinical attachment level (with the help of Williams periodontal probe).

Sample of venous blood was collected prior to any manipulation at baseline and two months after the treatment for determining the level of c-reactive protein. The venous blood was collected in vacutainer which were sent to the laboratory for biochemical analysis. Serum C- reactive protein levels were assessed by means of nephelometric method(Fig. 1).

On the first visit, patient was explained about the procedure which he/she has to undergo and an informed consent was taken. Detailed case history including clinical parameters, and the serum CRP levels were recorded. An extensive medical and dental history of each patient was taken. This was followed by

a comprehensive phase I therapy which included patient education and motivation, plaque control, scaling and root planning. The patients were given oral hygiene instructions for both mechanical and chemical plaque control by means of chlorhexidine mouthrinses(0.12% or 0.2% CHX) .

All subjects in all the 3 groups were subjected to non surgical periodontal therapy(NSPT) that included oral hygiene instructions and subgingival scaling and root planing at baseline. All the subjects were followed up for every 15 days for 2 months and oral prophylaxis was carried out at each visit.

Subjects in control group were advised to follow mechanical plaque control(modified bass tooth brushing technique) after completion of non surgical periodontal therapy(NSPT). Subjects in test group A and test group B were advisedto use CHX mouthrinses(0.12% & 0.2%) respectively along with mechanical plaque control after 1 month of completion of non surgical periodontal therapy. The patients were instructed to rinse twice daily for 30 seconds with 15 ml of the mouthwash following their routine tooth brushing (modified Bass technique) with a standard toothbrush.

Serum CRP levels and periodontal parameters were recorded for all the patients for all the three groups, one month and two months from base line after completion of non surgical periodontal therapy.

Data were tabulated and analysis was done with the help of Statistical Package SPSS 16.0. Mann-whitney U-test was used for the comparison of mean Percentage Difference in CRP, PI, GI, PD and CAL between control group and 0.12% and 0.20% CHX and between 0.12% and 0.20% CHX.

RESULT:

Percentage difference in CRP in Table 1.

Percentage difference in PI in Table 2.

Percentage difference in GI in Table 3.

Percentage difference in PD in Table 4.

Percentage difference in CAL in Table 5.

The mean percentage difference in CRP from 1-2 month for test group A(19.99 ±19.92) and control group (4.68 ±30.01) is significant($p<0.05$).

The mean percentage difference in CRP from 1-2 month for test group B(29.23 ±39.25) and control group (4.68 ±30.01) is significant($p<0.05$).

The mean percentage difference in GI from 1-2 month for test group A(5.36 ±0.92) and control group (3.71 ±1.79) is significant($p<0.05$).

The mean percentage difference in GI from 1-2 month for test group B(5.87 ±1.15) and control group (3.71 ±1.79) is significant($p<0.05$).

The mean percentage difference in GI from 0-2 month for test group B(18.25 ±2.41) and control group (16.31 ±1.44) is significant($p<0.05$).

Percentage reduction in CRP in graph 1.

Percentage reduction in PI in graph 2.

Percentage reduction in GI in graph 3.

Percentage reduction in PD in graph 4.

Percentage reduction in CAL in graph 5.

DISCUSSION:

The aim of the study was to evaluate the effect of different concentrations of Chlorhexidine(CHX) mouthrinses(0.12% & 0.2%) used as an adjunct to non surgical periodontal therapy on the clinical and haematological parameters(CRP) in patient suffering from generalized chronic periodontitis.

The result of the present study suggests that baseline systemic levels of non specific inflammatory markers(C-reactive protein) in subjects with chronic periodontitis were significantly reduced after using CHX mouthrinses as an adjunct to non surgical periodontal therapy. There was no significant difference found between test group A and test group B but comparable difference was found between control group where NSPT alone was performed and test groups by comparatively more reduction of CRP in test groups.

In the present study, non surgical periodontal therapy resulted in significant improvement in the recorded clinical parameters for all the three groups. In test group (A & B), CRP, PI, GI ,PD ,CAL improved more when compared to control group but there is no significant difference found between test group A and test group B.

In the study by Bokhari et al(2009), 1 month after mechanical therapy, the circulating levels of CRP, fibrinogen, and WBC counts were significantly reduced. CRP is a sensitive and reliable marker used to assess the systemic inflammatory burden and is a good predictor of coronary artery events. The decrease in CRP levels after periodontal treatment observed in this study was consistent with other studies. [7]

In F. D. Aiuto et al(2004) study, treatment of periodontitis was associated with a significant decrease in serum CRP in otherwise healthy individuals affected with severe, generalized periodontitis. Reductions in CRP were significant in subjects who responded better than average to the delivered periodontal therapy. In fact, 79.2% of the subjects who responded better to periodontal therapy showed an improvement in serum CRP. [8]

In a study performed by Andrea M et al(2009) showed that periodontal therapy led to a significant decrease in all clinical parameters, and the intragroup difference between baseline and 3 months after therapy had a P value of 0.0001 for the number of sites with PD >4 mm and a P value <0.0001 for all other clinical parameters. The data for hs-CRP showed that there was a decrease in hs-CRP values in the periodontal disease group after periodontal therapy (P = 0.006). There was greater than 50% decrease in the

concentrations of hs-CRP in the periodontal disease group 3 months after therapy.[9]

A definitive study, performed by Löe and Schiøtt, showed that rinsing for 60 seconds twice per day with 10 ml of 0.2% CHX (20 mg dose) inhibited plaque regrowth and the development of gingivitis.[10]

A 0.12% mouthrinse was manufactured using a 15 ml rinse volume (18 mg dose) in order to maintain the 20 mg dose present in the 10 ml of 0.2% rinses. Concentrations of 0.12% CHX appeard as effective as 0.2%, if the volume of the rinse was increased to 15 ml. [10]

In a study by Smith et al(1995) The efficacy of different CHX concentrations was evaluated over 4 days. This study also compared 15 ml of 0.12% CHX and 10 ml of 0.2% CHX, but both preparations used a 60-second rinsing time and a negative control of 15 ml solution without CHX was included. Both CHX preparations resulted in considerably less plaque accumulation compared to the control, but were essentially similar in their effects. [10]

Jan et al(2003) study investigated, in a 2-group parallel design, the effect of a 60-second rinse with 20 mg of chlorhexidine (10 ml of 0.2% CHX) with a 30-second rinse with an 18 mg dose (15 ml of a 0.12% CHX), during 72 hours of plaque accumulation. No statistically significant difference could be found between the 2 groups with regard to plaque formation on the teeth. Segreto et al. found, in their study comparing 0.2% CHX versus 0.12% CHX, both 15 ml and 30 seconds, similar minor differences and suggested a better compliance with mouthrinses containing less than 0.2% chlorhexidine. [11]

Carlos et al (2007), observed no differences were in terms of antiplaque efficacy between the 0.12% and 0.20% chlorhexidine rinsing solutions. Chlorhexidine rinsing keeps plaque levels low, but allows some degree of gingival inflammation after 14 days.[12]

Jenkins et al.18 (1989), with an experimental design similar to ours, demonstrated less plaque accumulation when the higher concentration was tested. Ernst et al.19 (1998) also did not demonstrate statistically significant differences between 0.1% and 0.2% chlorhexidine rinses as adjuncts to mechanical plaque control in a larger sample of 130 subjects. The same result was obtained by Asari et al.20 (1996) when these two chlorhexidine concentrations were used as subgingival irrigators. [12]

In Pietruska M et al(2006) study, GI were significantly reduced after treatment. The greatest difference in these parameters was observed in group III, where apart from Corsodyl gel (chlorhexidine digluconate preparation) surgical dressing was applied, and in the control group where no pharmacological treatment was instituted. [13]

Heasman et al. showed superior results after SRP plus a degradable drug delivery

system containing 2.5 mg chlorhexidine gluconate compared to SRP alone for PD reduction (0.78 and 0.45 mm, respectively; P = 0.05) and CAL gain (0.43 and 0.15mm,respectively; P = 0.048). [14]

A major limitation of this study involves the small number of subjects in each group. Therefore the results obtained should be further corroborated using a larger number sample size.

CONCLUSION:

This study not only revealed that non surgical periodontal therapy (NSPT) reduce the CRP levels in generalized chronic periodontitis patients by reducing or eliminating periodontal inflammation which was also confirmed by many previous studies, but also showed that different concentrations of chlorhexidine (0.12% &0.2%) mouthrinses used as an adjunct to non surgical periodontal therapy were more helpful in reducing the CRP levels and improved the clinical parameters when compared to non surgical periodontal therapy alone.

There were no difference observed in term of clinical and haematological efficacy between 0.12% and 0.2% chlorhexidine mouthrinses.

The result obtained in the present study will allow the design and implementation of a large scale intervention trial. Since very limited literature is available, further studies are needed for exploration of the effect of CHX mouthrinses on CRP levels, used as an adjunct to non surgical periodontal therapy in the treatment of patient suffering from generalized chronic periodontitis.

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TABLES: Table 1

	GROUP	N	Mean % reduction	Std. Deviation	Sig. (2-tailed)
Percentage Difference in CRP from 0 to 1 month	0.12%	10	4.00	3.78	0.486
	0.20%	10	-0.15	18.08	
Percentage Difference in CRP from 0 to 2 month	0.12%	10	18.67	17.52	0.987
	0.20%	10	18.88	35.16	
Percentage Difference in CRP from 1 to 2 month	0.12%	10	19.99	19.92	0.515
	0.20%	10	29.23	39.25	
Percentage Difference in CRP from 0 to 1 month	0.12%	10	4	3.78	0.074
	Control	10	11.02	11.09	
Percentage Difference in CRP from 0 to 2 month	0.12%	10	18.67	17.52	0.128
	Control	10	-3.9	41.22	
Percentage Difference in CRP from 1 to 2 month	0.12%	10	19.99	19.92	**0.044***
	Control	10	-4.68	30.01	
Percentage Difference in CRP from 0 to 1 month	0.20%	10	-0.15	18.08	0.113
	Control	10	11.02	11.09	
Percentage Difference in CRP from 0 to 2 month	0.20%	10	18.88	35.16	0.2
	Control	10	-3.9	41.22	
Percentage Difference in CRP from 1 to 2 month	0.20%	10	29.23	39.25	**0.044***
	Control	10	-4.68	30.01	
Percentage Difference in CRP from 0 to 1 month	0.12%	10	4	3.78	0.074
	Control	10	11.02	11.09	
Percentage Difference in CRP from 0 to 2 month	0.12%	10	18.67	17.52	0.128
	Control	10	-3.9	41.22	
Percentage Difference in CRP from 1 to 2 month	0.12%	10	19.99	19.92	**0.044***
	Control	10	-4.68	30.01	

Table 2

	GROUP	N	Mean % reduction	Std. Deviation	Sig. (2-tailed)
Percentage Difference in PI from 0 to 1 month	0.12%	10	12.86	1.1	0.372
	0.20%	10	12.41	1.1	
Percentage Difference in PI from 0 to 2 month	0.12%	10	20.64	2.01	0.759
	0.20%	10	20.94	2.38	
Percentage Difference in PI from 1 to 2 month	0.12%	10	6.75	0.97	0.071
	0.20%	10	7.27	1.4	
Percentage Difference in PI from 0 to 1 month	0.12%	10	12.86	1.1	0.734
	Control	10	13.08	1.7	
Percentage Difference in PI from 0 to 2 month	0.12%	10	20.64	2.01	0.637
	Control	10	21.1	2.27	
Percentage Difference in PI from 1 to 2 month	0.12%	10	6.24	0.97	0.698
	Control	10	6.4	0.88	
Percentage Difference in PI from 0 to 1 month	0.20%	10	12.41	1.1	0.307
	Control	10	13.08	1.7	
Percentage Difference in PI from 0 to 2 month	0.20%	10	20.94	2.38	0.885
	Control	10	21.1	2.27	
Percentage Difference in PI from 1 to 2 month	0.20%	10	7.27	1.4	0.114
	Control	10	6.4	0.88	

Table 3

	G	N	Mean % reduction	Std. Deviation	Sig. (2-tailed)
Percentage Difference in GI from 0 to 1 month	0.12%	10	10.81	0.88	0.351
	0.20%	10	11.27	1.22	
Percentage Difference in GI from 0 to 2 month	0.12%	10	17.22	1.86	0.295
	0.20%	10	18.25	2.41	
Percentage Difference in GI from 1 to 2 month	0.12%	10	5.36	0.92	0.289
	0.20%	10	5.87	1.15	
Percentage Difference in GI from 0 to 1 month	0.12%	10	10.81	0.88	0.473
	Control	10	11.28	1.82	
Percentage Difference in GI from 0 to 2 month	0.12%	10	17.22	1.86	0.239
	Control	10	16.31	1.44	
Percentage Difference in GI from 1 to 2 month	0.12%	10	5.36	0.92	**0.018***
	Control	10	3.71	1.79	
Percentage Difference in GI from 0 to 1 month	0.20%	10	11.27	1.22	0.985
	Control	10	11.28	1.82	
Percentage Difference in GI from 0 to 2 month	0.20%	10	18.25	2.41	**0.042***
	Control	10	16.31	1.44	
Percentage Difference in GI from 1 to 2 month	0.20%	10	5.87	1.15	**0.005***
	Control	10	3.71	1.79	

Table 4

	GROUP	N	Mean % reduction	Std. Deviation	Sig. (2-tailed)
Percentage Difference in PD from 0 to 1 month	0.12%	10	9.42	4.42	0.936
	0.20%	10	9.57	3.83	
Percentage Difference in PD from 0 to 2 month	0.12%	10	21.1	8.77	0.806
	0.20%	10	22.06	8.48	
Percentage Difference in PD from 1 to 2 month	0.12%	10	13.18	13.28	0.966
	0.20%	10	13.4	9.26	
Percentage Difference in PD from 0 to 1 month	0.12%	10	9.42	4.42	0.989
	Control	10	9.39	3.81	
Percentage Difference in PD from 0 to 2 month	0.12%	10	21.1	8.77	0.917
	Control	10	21.45	5.65	
Percentage Difference in PD from 1 to 2 month	0.12%	10	13.18	13.28	0.844
	Control	10	12.32	3.02	
Percentage Difference in PD from 0 to 1 month	0.20%	10	9.57	3.83	0.918
	Control	10	9.39	3.81	
Percentage Difference in PD from 0 to 2 month	0.20%	10	22.06	8.48	0.851
	Control	10	21.45	5.65	
Percentage Difference in PD from 1 to 2 month	0.20%	10	13.4	9.26	0.729
	Control	10	12.32	3.02	

Table 5

	GROUP	N	Mean % reduction	Std. Deviation	Sig. (2-tailed)
Percentage Difference in CAL from 0 to 1 month	0.12%	10	10.23	6	0.297
	0.20%	10	7.03	7.28	
Percentage Difference in CAL from 0 to 2 month	0.12%	10	24.17	7.31	0.885
	0.20%	10	23.67	7.9	
Percentage Difference in CAL from 1 to 2 month	0.12%	10	14.41	7.17	0.195
	0.20%	10	18.64	6.89	
Percentage Difference in CAL from 0 to 1 month	0.12%	10	10.23	6	0.816
	Control	10	10.84	5.51	
Percentage Difference in CAL from 0 to 2 month	0.12%	10	24.17	7.31	0.921
	Control	10	24.54	9.37	
Percentage Difference in CAL from 1 to 2 month	0.12%	10	14.41	7.17	0.95
	Control	10	14.18	8.94	

Percentage Difference in CAL from 0 to 1 month	0.20%	10	7.03	7.28	0.203
	Control	10	10.84	5.51	
Percentage Difference in CAL from 0 to 2 month	0.20%	10	23.67	7.9	0.824
	Control	10	24.54	9.37	
Percentage Difference in CAL from 1 to 2 month	0.20%	10	18.64	6.89	0.227
	Control	10	14.18	8.94	
Percentage Difference in CAL from 0 to 1 month	0.12%	10	10.23	6	0.816
	Control	10	10.84	5.51	
Percentage Difference in CAL from 0 to 2 month	0.12%	10	24.17	7.31	0.921
	Control	10	24.54	9.37	
Percentage Difference in CAL from 1 to 2 month	0.12%	10	14.41	7.17	0.95
	Control	10	14.18	8.94	

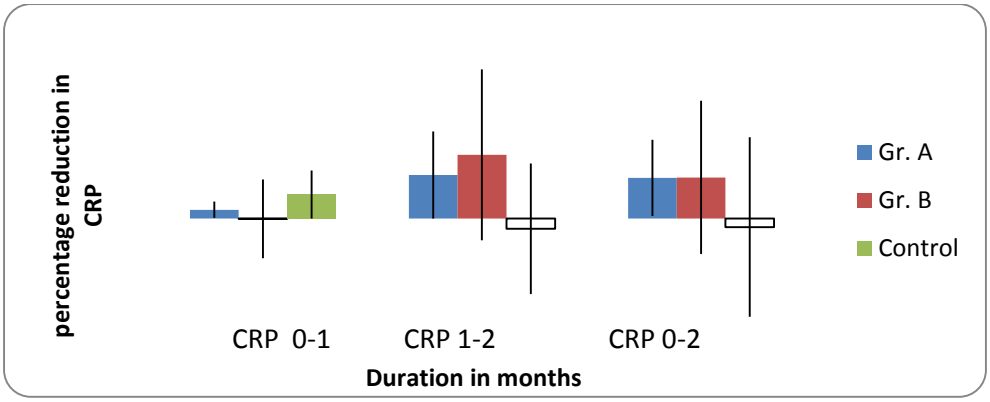
Table 6

		Mean	Std. Deviation	p-value
CRP BASELINE	0.12%	3.72	2.54	0.209
	0.20%	2.37	2.03	
CRP BASELINE	0.20%	2.37	2.03	0.902
	Control	2.32	2.18	
PI baseline	0.12%	1.59	0.18	0.832
	0.20%	1.65	0.18	
PI baseline	0.20%	1.65	0.18	0.561
	Control	1.51	0.13	
GI - baseline	0.12%	1.54	0.22	0.829
	0.20%	1.63	0.20	
GI - baseline	0.20%	1.63	0.20	0.229
	Control	1.48	0.17	
PD - baseline	0.12%	3.02	0.26	0.879
	0.20%	2.99	0.44	
PD - baseline	0.20%	2.99	0.44	0.732
	Control	3.06	0.38	
CAL - baseline	0.12%	3.48	0.77	0.698

	0.20%	3.17	0.76	
CAL - baseline	0.20%	3.17	0.76	0.791
	Control	3.08	0.44	

GRAPH:

Graph 1



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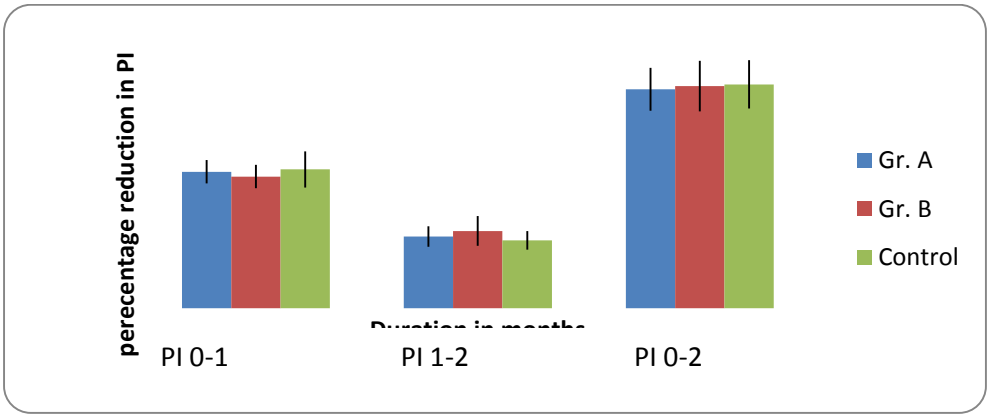
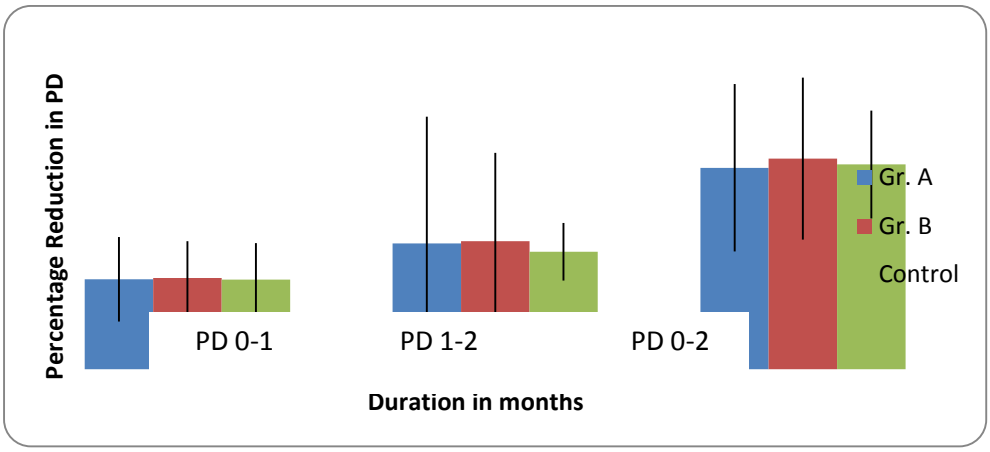


Graph 3

Graph 4



Graph 5