Effect of Non surgical Periodontal Therapy on Gingival Parameters of Diabetic and Non Diabetic Periodontitis Patients: A Prospective Clinical Study

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ABSTRACT

Introduction: Non Surgical Periodontal Therapy (NSPT) has been an effective treatment for suppression of gingival inflammation and improvement of periodontal health in patients. Periodontitis and diabetes have an inter-relationship with each other. Surgical intervention is not always advisable for periodontitis patients with diabetes. Hence, assessing the response of non surgical periodontal treatment in diabetic patients can lead to better and non invasive treatment options.

Aim: To evaluate the effect of NSPT by observing changes in Gingival Index (GI), Plaque Index (PI), Clinical Attachment Loss (CAL), and volume of Gingival Crevicular Fluid (GCF) in diabetic and systemically healthy periodontitis patients.

Materials and Methods: This was a prospective clinical study conducted in the Department of Periodontology, Rural Dental College, Loni, Maharashtra from January 2021 until June 2022. Total of 90 patients were assessed and were divided into three groups. Group A (n=30) included the patients with healthy periodontium and without any systemic disease. Group B (n=30) included the patients with controlled diabetes, with CAL in ranges of 3-4 mm (stage II periodontitis). Group C (n=30) included the patients who are systemically healthy, with CAL in ranges of 3-4 mm (Stage II periodontitis). Clinical parameters including GI, PI, Periodontal Probing Depth (PPD), CAL and volume of GCF were evaluated at baseline. NSPT was performed and parameters were evaluated after three months and then compared with baseline. Statistical analysis was done by descriptive statistics as mean, SD, percentage etc.

Results: A total of 90 patients were included, of which 44 were male patients and 46 were female patients, within the age range of 18-60 years. Patients were grouped 30 each in all three groups A, B, and C with mean age 39.60±7.89, 45.70±10.02 and 43.90±9.64 respectively. The sites of group B showed statistically significant improvement in PPD at three months (1.80±0.76) compared to group C. Sites of group B also showed significant improvement in GI (1.46±0.45). There was no significant difference in the improvements of PI, Volume of GCF and CAL between group B and C at three months.

Conclusion: The present study demonstrated marked improvements in the clinical parameters and their outcomes when the systemically healthy periodontitis patients and diabetic patients are treated with NSPT.

Keywords: Diabetes, Periodontal pocket, Periotron

INTRODUCTION

Periodontitis is defined as an inflammatory disease of supporting tissues of teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both [1].

Periodontal disorders are now considered as multifactorial, complicated disorders that involve a complex interaction between the host immune system, inflammatory responses, and environmental modifying factors in the subgingival microbiota [2]. Therefore, periodontal health must encompass a holistic review of all aspects involved in the emergence of disease as well as the restoration and maintenance of health.

Diabetes and periodontitis are two complicated chronic diseases that are interrelated. People with diabetes have two to three times higher risk of developing periodontitis than people without the disease, and the degree of glycaemic control is a critical factor in predicting risk. Periodontitis is linked to higher glycated haemoglobin and fasting blood glucose levels in adults without diabetes, and severe periodontitis is linked to an increased risk of developing diabetes [3].

It is essential to determine these significant factors of periodontal health and illness for each patient in order to achieve and maintain oral health. Diabetes Mellitus (DM) has for many years, been recognised as an important risk factor for periodontal diseases and associated with significantly higher prevalence and severity of periodontitis [4].

The present study was to evaluate the effect of NSPT in diabetic and systemically healthy periodontitis patients. Previous studies [5-9] have evaluated the effect of non surgical treatment in periodontitis patients. These studies have not taken into consideration the new staging of periodontitis and its response to NSPT. The present study evaluated patients on the basis of new staging of periodontitis given by American Academy of Periodontology (2017) [10]. In this study, we assessed the patients with stage II Periodontitis as stage III and IV periodontitis would include patients with increased bone loss, increased CAL, furcation involvement and loss of teeth. This would not allow accurate evaluation of effect of NSPT. Dentists must inform their patients and their physicians about the connections between glycaemic control and periodontal health, emphasising the inflammatory nature of periodontal disorders and possible systemic complications of periodontal infection.

Hence, our present study aims to evaluate the effect of NSPT in diabetic and non diabetic patients so that a proper treatment plan with significant outcome would be implemented for both the groups leading to a good periodontal health in future.

MATERIALS AND METHODS

This prospective clinical study was conducted in the Deparment of Periodontology, Rural Dental College, Loni, Maharashtra, from January 2021 until June 2022. The protocol was approved by institutional ethical committee. (Ethical committee approval number:

PIMS/RDC/IEC-UG-PG/2020/09-2020). The sample population included 90 patients out of which 44 were male patients and 46 were female patients, within the age range of 18-60 years.

The patients were scrutinised following the undermentioned inclusion and exclusion criteria.

Inclusion criteria:

1. Age group 18 to 60 years of either sex.

2. Controlled group: Patients with healthy periodontium and no systemic disease.

    Cases group: Patients with periodontitis with CAL between 3-4 mm (stage II Periodontitis).

3. The presence of Blood Sugar Level (BSL) fasting in ranges of 70-100 mg/dL and BSL Postprandial (PP) in ranges of 100-180 mg/dL in diabetic patients [11].

4. The patients should be above 18-year-old with an ability to maintain good oral hygiene.

5. The patients giving informed consent for the study were included.

Exclusion criteria:

1. Any systemic illness other than diabetes known to affect the outcome of periodontal therapy.

2. Allergic to medications.

3. Pregnant and lactating women.

4. Use of tobacco/smoking in any form.

5. Patients under anticoagulation treatment or bleeding disorder.

6. Patients with caries or restorations in the area to be treated.

7. Patients with orthodontic malformed teeth.

8. Patients who had undergone any periodontal treatment.

Procedure

Detailed case history of the patients was recorded. In order to have systematic and methodical recording of all observations and information required for the study special case history proforma was designed. Informed consent was obtained from all participants. Treatment procedures were completely explained to all patients before the study. The subjects were assigned into three groups by checking their CAL and BSLs as follows:

Group A: The patients with healthy periodontium and without any systemic disease.

Group B: The patients with controlled diabetes i.e., with BSL fasting and PP in ranges of 70-100 mg/dL and 100-180 mg/dL respectively and periodontitis with CAL in ranges of 3-4 mm (stage II Periodontitis).

Group C: The patients who are systemically healthy with periodontitis with CAL in ranges of 3-4 mm (stage-II Periodontitis).

Both the groups will be studied for the following variables given in [Table/Fig-1] [12-14].

Measurement variables	Measurement scale	Methods of measurement	Units of measurement
Age	Ratio	Interview	Years
Gender	Nominal	Observation	Male/Female
Plaque Index (PI) [12]	Ordinal	Dental explorer	Index
Gingival Index (G I) [12]	Ordinal	Williams graduated probe	Index
Probing pocket depth [13]	Ratio	UNC-15 probe	Millimeters
CAL [13]	Ratio	Williams graduated probe	Millimeters
Volume of Gingival Crevicular Fluid (GCF) [14]	Ratio	Periotron- 8000	Microlitres (μL)

[Table/Fig-1]: Variables studied.

Method of assessment [Table/Fig-2-5]: All clinical parameters were recorded along with age and gender of patient. GCF quantification was done using Periotron-8000 and periopaper. To record the volume of GCF the 16, 26, 31, 41 teeth were dried using cotton rolls. The paper strips were inserted 1 mm intracrevicularly for 30s and then the values of Periotron-8000 were converted using Periotron Professional 3.0 software. Scaling and root planing therapy was performed for patients with supragingival, subgingival, ultrasonic scalers and root planing was performed with a set of gracey curettes. Oral hygiene instructions and method of tooth brushing was demonstrated to each patient. Patients were recalled after three months to evaluate the same parameters again i.e., GI, PI, PPD, CAL, and volume of GCF.
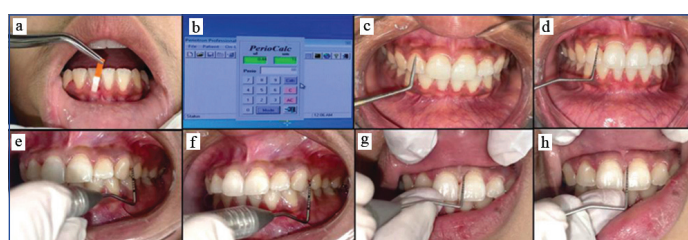

[Table/Fig-2]: Armamentarium.
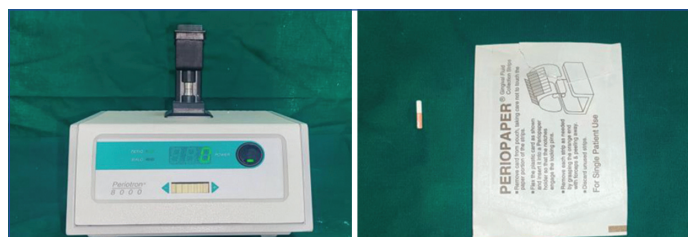
[Table/Fig-3]: Periotron-8000.
[Table/Fig-4]: Periopaper. (Images from left to right)

[Table/Fig-5]: a) Insertion of periopaper into the gingival sulcus; b) Conversion of Periotron- 8000 values into microlitres; c) Assessment of PI; d) Assessment of GI; e) Assessment of PPD at baseline; f) Assessment of PPD at three months; g) Assessment of Clinical Attachment Loss (CAL) at baseline; h) Assessment of Clinical Attachment Loss (CAL) at three months.

STATISTICAL ANALYSIS

Statistical analysis was done by descriptive statistics as mean, Standard Deviation (SD), percentage etc. The comparison of mean values of PI, GI, PPD, CAL and volume of GCF after NSPT in group A, B and C from baseline to after three months was done by applying Student's Paired t-test at 5% (p-value=0.05) and 1% (p-value=0.01) level of significance. Also, comparison of mean values of PI, GI, PPD/sulcular depth, CAL and volume of GCF after three months NSPT in group A, B and C was done by applying Student's Unpaired t-test at 5% (p-value=0.05) and 1% (p-value=0.01) level of significance. The statistical analysis software namely SYSTAT version 12 (made by Crane's software, Bangalore) a licensed copy was used for analysis of data.

RESULTS

The distribution of different groups of age and gender has been depicted in the [Table/Fig-6]. Group A constituted of 15 males and 15 females, group B constituted of 14 males and 15 females, group C constituted of 15 males and 15 females.

Age in years	Group A		Group B		Group C	
	Males	Females	Males	Females	Males	Females
<25	3	0	0	1	0	2
>25-35	3	5	1	2	2	2
>35-45	5	5	7	3	7	3
>45-55	3	4	6	5	4	7
>55-65	1	1	0	5	2	1
Total	15	15	14	16	15	15
Mean±SD	39.60±7.89		45.70±10.02		43.90±9.64	

[Table/Fig-6]: Age and gender wise distribution in all groups under study.

Intragroup comparison between group A: The mean and SD of variables PI, GI, sulcular depth, CAL, volume of GCF were compared within group A from baseline to three months and are depicted in [Table/Fig-7] where intragroup comparison had been done for group A. There was no significant difference between mean values of PI, GI, sulcular depth, CAL and volume of GCF after NSPT (baseline to three months) in group A (p-value >0.005).

Parameters	Group A (n=30)		Student's paired t-test value	p-value
	Baseline	3 months		
	Mean±SD	Mean±SD		
Plaque Index (PI)	0	0	-	-
Gingival Index (GI)	0	0	-	-
Probing pocket depth/Sulcular depth	1.70±0.49	1.76±0.54	0.9847	p=0.2658
Clinical Attachment Loss (CAL)	0	0	-	-
Volume of Gingival Crevicular Fluid (GCF)	0.67±0.13	0.63±0.12	0.447	p=0.1479

[Table/Fig-7]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), sulcular depth, Clinical Attachment Loss (CAL) and volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group A, at baseline and three months.

Intragroup comparison between group B: The mean and SD of variables PI, GI, PPD, CAL, volume of GCF were compared within group B from baseline to three months which are depicted in [Table/Fig-8], where intragroup comparison had been done for group B. There was significant difference between mean values of PI, GI, PPD, CAL and volume of GCF after NSPT (baseline to 3 months) in group B (p-value=0.0001).

Parameters	Group B (n=30)		Student's paired t-test value	p-value
	Baseline	3 months		
	Mean±SD	Mean±SD		
Plaque Index (PI)	2.01±0.42	1.49±0.48	6.926	p=0.0001
Gingival Index (GI)	1.96±0.37	1.46±0.45	8.533	p=0.0001
Probing Pocket Depth (PPD)	4.13±1.0	1.80±0.76	17.971	p=0.0001
Clinical Attachment Loss (CAL)	3.50±0.51	2.0±0.69	10.536	p=0.0001
Volume of Gingival Crevicular Fluid (GCF)	1.02±0.16	0.85±0.13	4.521	p=0.0001

[Table/Fig-8]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group B, at baseline and three months.

Intragroup comparison between group C: The mean and SD of variables PI, GI, PPD, CAL, volume of GCF were compared within group C from baseline to three months which are depicted in [Table/Fig-9], where intragroup comparison had been done for group C. There was significant difference between mean values of PI, GI, PPD, CAL and volume of GCF after NSPT (baseline to three months) in group C (p-value=0.0001).

Parameters	Group C (n=30)		Student's paired t-test value	p-value
	Baseline	3 months		
	Mean±SD	Mean±SD		
Plaque Index (PI)	2.30±0.57	1.49±0.56	9.562	p=0.0001
Gingival Index (GI)	2.13±0.30	1.53±0.44	8.294	p=0.0001
Probing Pocket Depth (PPD)	5.10±1.06	3.0±0.87	9.957	p=0.0001
Clinical Attachment Loss (CAL)	3.50±0.50	2.17±0.59	9.633	p=0.0001
Volume of Gingival Crevicular Fluid (GCF)	1.05±0.18	0.89±0.27	3.525	p=0.0001

[Table/Fig-9]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after NSPT in group C, at baseline and three months.

Intergroup comparison: On intergroup comparison between group A and B and between group A and C at baseline, significant difference was found between all the parameters [Table/Fig-10,11]. However, no significant difference was found between all the parameters between group B and C [Table/Fig-12]. Comparison of percentage (%) decrease from baseline to three months of all the ginginval parameters for all the groups has been depicted in [Table/Fig-13].

Parameters	Group A	Group B	Student's Unpaired t-test value	p-value
	Baseline	Baseline		
	Mean±SD	Mean±SD		
Plaque Index (PI)	0	2.01±0.42	2.478	p=0.001
Gingival Index (GI)	0	1.96 0.37	2.113	p=0.001
Probing pocket depth/Sulcular depth	1.70±0.49	4.13±1.0	3.697	p=0.001
Clinical Attachment Loss (CAL)	0	3.5±0.51	3.826	p=0.001
Volume of Gingival Crevicular Fluid (GCF)	0.67±0.13	1.02±0.16	1.999	p=0.0089

[Table/Fig-10]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD)/Sulcular depth, Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) in group A and B at baseline.

Parameters	Group A	Group C	Student's unpaired t-test value	p-value
	Baseline	Baseline		
	Mean±SD	Mean±SD		
Plaque Index (PI)	0	2.30±0.57	3.012	p=0.001
Gingival Index (GI)	0	2.13±0.30	2.879	p=0.001
Probing pocket depth (PPD)/Sulcular depth	1.70±0.49	5.10±1.06	3.441	p=0.001
Clinical Attachment Loss (CAL)	0	3.50±0.50	3.694	p=0.001
Volume of Gingival Crevicular Fluid (GCF)	0.67±0.13	1.05±0.18	1.9745	p=0.0041

[Table/Fig-11]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD)/Sulcular depth, Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) in group A and C at baseline.

Parameters	Group B	Group C	Student's unpaired t-test value	p-value
	Baseline	Baseline		
	Mean±SD	Mean±SD		
Plaque Index (PI)	2.01±0.42	2.30±0.57	1.201	p=0.5479
Gingival Index (GI)	1.96±0.37	2.13±0.30	0.447	p=0.2311

Probing Pocket Depth (PPD)/Sulcular depth	4.13±1.0	5.10±1.06	1.774	p=0.9715
Clinical Attachment Loss (CAL)	3.50±0.51	3.50±0.50	0.00	
Volume of Gingival Crevicular Fluid (GCF)	1.02±0.16	1.05±0.18	0.679	p=0.2116

[Table/Fig-12]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth(PPD)/Sulcular depth, Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) in group B and C at baseline.

	Percentage (%) decrease from baseline to three months		
Parameters	Group A (n=30)	Group B (n=30)	Group C (n=30)
Plaque Index (PI)	0%	25.87%	35.21%
Gingival Index (GI)	0%	25.51%	28.16%
Probing Pocket Depth (PPD)/Sulcular depth	3.41%	56.41%	41.17%
Clinical Attachment Loss (CAL)	0%	42.86%	38.0%
Volume of Gingival Crevicular Fluid (GCF)	5.97%	16.67%	15.23%

[Table/Fig-13]: Comparison of percentage (%) decrease from baseline to three months of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group A, B and C.

Intergroup comparison between group A and group B: The mean and SD of variables PI, GI, PPD, CAL, volume of GCF were compared between group A and group B after three months which are depicted in [Table/Fig-14] where intergroup comparison had been done for group A and group B. There was a significant difference between mean values of PI, GI, PPD/Sulcular depth, CAL and volume of GCF after three months of NSPT when group A was compared with group B (p-value=0.0001).

	Group A	Group B		
	3 months	3 months	Student's unpaired t-test value	
Parameters	Mean±SD	Mean±SD		p-value
Plaque Index (PI)	0	1.49±0.48	5.336	p=0.0001
Gingival Index (GI)	0	1.46±0.45	10.225	p=0.0001
Probing Pocket Depth (PPD)/ Sulcular depth	1.76±0.54	1.80±0.76	2.347	p=0.0001
Clinical Attachment Loss (CAL)	0	2.0±0.69	5.023	p=0.0001
Volume of Gingival Crevicular Fluid (GCF)	0.63±0.12	0.85±0.13	2.442	p=0.0001

[Table/Fig-14]: Comparison of mean and SD values of Plaque Index, Gingival Index, Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group A and group B.

Intergroup comparison between group A and C: The mean and SD of variables PI, GI, PPD, CAL, volume of GCF were compared between group A and C after three months which are depicted in [Table/Fig-15], where intergroup comparison has been done for group A and group C. There was a significant difference between mean values of PI, GI, PPD/sulcular depth, CAL and volume of GCF after three months of NSPT when group A was compared with group C (p-value=0.0001).

Intergroup comparison between group B and group C: The mean and SD of variables PI, GI, PPD, CAL, volume of GCF were compared between group B and C after three months which are depicted in [Table/Fig-16] where intergroup comparison had been done for group B and group C. There was a significant difference between mean values of GI, probing pocket depth after three months of NSPT when group B was compared with group C. While PI, CAL and volume of GCF showed no significant difference after three months of NSPT when group B was compared with group C.

	Group A	Group C		
	3 months	3 months	Student's Unpaired t-test value	
Parameters	Mean±SD	Mean±SD		p-value
Plaque Index (PI)	0	1.49±0.56	5.347	p=0.0001
Gingival Index (GI)	0	1.53±0.44	9.566	p=0.0001
Probing Pocket Depth (PPD)/ Sulcular depth	1.76±0.54	3.0±0.87	6.256	p=0.0001
Clinical Attachment Loss (CAL)	0	2.17±0.59	6.097	p=0.0001
Volume of Gingival Crevicular Fluid (GCF)	0.63±0.12	0.89±0.27	2.968	p=0.0001

[Table/Fig-15]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group A and group C.

	Group B	Group C		
	3 months	3 months	Student's unpaired t-test value	
Parameters	Mean±SD	Mean±SD		p-value
Plaque Index (PI)	1.49±0.48	1.49±0.56	0.03928	p=0.9688
Gingival Index (GI)	1.46±0.45	1.53±0.44	0.6443	p=0.5220
Probing Pocket Depth (PPD)	1.80±0.76	3.0±0.87	5.682	p=0.0001
Clinical Attachment Loss (CAL)	2.0±0.69	2.17±0.59	1.044	p=0.3008
Volume of Gingival Crevicular Fluid (GCF)	0.85±0.13	0.89±0.27	1.426	p=0.1847

[Table/Fig-16]: Comparison of mean and SD values of Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), Clinical Attachment Loss (CAL) and Volume of Gingival Crevicular Fluid (GCF) after Non Surgical Periodontal Therapy (NSPT) in group B and group C.

DISCUSSION

The present study demonstrated marked improvements in the clinical parameters and their outcomes when the systemically healthy periodontitis patients and diabetic patients were treated with NSPT.

Mealey BL and Oates TW concluded that diabetic patients had a three-fold higher risk of periodontal disease compared with non diabetic patients after controlling for age, sex, and other confounding factors [15]. In a study by Preferansow E et al., it was concluded that uncontrolled diabetes was the crucial cause of periodontal changes and, to a large extent, influenced the function of the masticatory organ in patients [16]. Hence, patients with controlled diabetes were assessed in the study so as to avoid inaccurate results and also to correctly evaluate outcome of periodontal therapy. Thus, it is of utmost important for diabetic patients to maintain a good periodontal environment that is less conducive to bacterial plaque retention.

A study by Cruz GA et al., examined the clinical and biochemical changes in patients with and without Diabetes Mellitus (DM) three months following full-mouth scaling and root planning [5]. It was concluded that there was no significant difference in non surgical periodontal treatment using full-mouth root planing in clinical and laboratory responses between DM and Non Diabetes Mellitus (NDM) groups after three months of follow-up. This accords with our study in which there was significant reduction from baseline to three months in PI in both group B and group C. Also, there was no significant difference found between both group B and group C at three months, in PI. On intergroup analysis the mean PI of group B and group C after three months did not show significant difference. Bridges RB et al., discovered a higher level of plaque and gingival bleeding in people with diabetes, while Kawamura M et al., observed no correlation between plaque accumulation and the presence of periodontal disease because patients maintained a good level of oral hygiene [6,7].

In study by Cruz GA et al., there was significant difference in GI from baseline to three months of NSPT [5]. This is in accordance with

current study where significant difference was found in intragroup analysis from baseline to three months in GI. On intergroup analysis the mean GI of group A and group B after three months showed significant difference. On intergroup analysis the mean GI of group A and group C after three months showed significant difference. The mean GI of group B and group C after three months showed significant difference this was in contrary to study by Cruz GA et al., [5].

On intergroup analysis the mean PPD/sulcular depth of group A and group B after three months showed significant difference. On intergroup analysis the mean PPD/sulcular depth of group A and group C after three months showed significant difference. On intergroup analysis the mean PPD of group B and group C after three months showed significant difference. This is in accordance with study done by Faria-Almeida R et al., where on assessing patients with diabetes after NSPT statistically significant differences in probing depths were observed between the control and diabetic groups at all times [8].

On intergroup analysis, the mean CAL of group A and group B after three months showed significant difference. On intergroup analysis the mean CAL of group A and group C after three months showed significant difference. On intergroup analysis the mean CAL of group B and group C after three months did not show significant difference. This is in accordance with study done by Cruz GA et al., no differences were observed between the DM and NDM groups when evaluated after periodontal therapy performed in a single session using full-mouth SRP [5]. The intragroup evaluation showed CAL gains in both groups.

In a longitudinal study done by Rossi V et al., showed reduction in volume of GCF after NSPT [9], this accords with current study where significant reduction in volume of GCF was found after NSPT. On intergroup analysis the mean volume of GCF of group A and group B after three months showed significant difference. On intergroup analysis the mean volume of GCF of group A and group C after three months showed significant difference. On intergroup analysis the mean volume of GCF of group B and group C after three months did not show significant difference.

Thus, the results of present study favour NSPT as one of the treatment modalities in periodontitis with or without diabetes. The results show that significant improvement in clinical parameters can be seen in non diabetic as well as diabetic patients.

Limitation(s)

Limitation of our study included selection bias as study was confined to specific rural area only. The sample size for our study was small and long term follow-up was required. For evaluation of volume of GCF the samples were collected only once but, for appropriate results could be collected in intervals. Some confounding bias could also be present as it is a cross-sectional study. In the present study UNC-15, and Williams probe were used, which could be replaced by advanced diagnostic aids to avoid observational errors.

CONCLUSION(S)

NSPT could lead to significant improvement in periodontal health of diabetic and non diabetic patients. Parameters like volume of GCF, PI, GI, CAL and probing depth help in assessment of periodontal health and amount of improvement in periodontal health after treatment in diabetic patients. There was significant improvement in all parameters, in all the three groups post therapy. However, there was no significant difference in the outcome of NSPT in diabetic and non diabetic periodontitis patients except for GI and PPD in group B and group C. Thus, NSPT can be an effective measure in assessment and improvement of the periodontal health in diabetic patients. Future perspective includes conducting longitudinal studies with a large sample size for better outcomes. Also, randomised blinded clinical trials can be conducted.

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