Effect of Non Surgical Periodontal Therapy on Salivary Ph in Periodontal Disease: A Randomized Clinical Trial

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Authors' contributions

This work was carried out in collaboration amongst all authors. Author SG designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors Shradha and ES managed the analyses of the study. Authors HS, SS and RG managed the literature searches. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

The aim of the study is to assess the effect of pre and post Non Surgical Periodontal Therapy on Salivary pH in patients suffering with Chronic Periodontits. Patients reporting to the Department of Periodontics, I.T.S Dental College, Hospital & Research Centre, Greater Noida, Uttar Pradesh are included in the study. It is a randomized clinical trial where patients are randomized into two groups of Generalized Chronic Gingivitis and Generalized Chronic Periodontitis. The study are performed with the Sample size of 30 patients and 2 months Period were included. Unstimulated Saliva is collected at the first visit when patient reports to the OPD for NSPT. Clinical Parameters are recorded and NSPT is performed for the patient. Post 14 days of the treatment, saliva is collected and analysed for pH and clinical parameters are recorded again. pH is determined using a pH meter. Data is collected and statistically interpreted. The statistical testing to be used in this study

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are Mann Whitney U Test, Chi- square test and Paired t-test. There was statistically significant difference in plaque index, gingival index and oral hygiene index between two groups. There was a definite reduction in pH post SRP but it was statistically non significant due to relatively smaller sample size. Further research is required to substantiate the results for the same.

1. INTRODUCTION

Oral diseases such as dental caries, gingivitis and periodontitis are initiated at the interface between microbial ecosystem and host tissue [1].

The diagnosis of active phases of periodontal disease and the identification of patients at risk for active disease represents a challenge for both clinical investigators and clinicians. In general, clinical parameters such as probing depth, attachment level, bleeding on probing, plaque and gingival indices are used to assess disease severity.

Saliva is a dilute fluid, over 99% being made up of water. With a multitude of biomarkers, the salivary pH may be used as a quick chair side test.

Saliva has a pH normal range of 6.2 to 7.6 with 6.7 being the average pH. A saliva pH below 7.0 usually indicates academia (abnormal acidity of the blood). If a chronic condition exist the mouth is more susceptible to dental decay, halitosis and periodontitis. A saliva pH above 7.0 usually indicates alkalinity. Excessive alkalinity can bring about the same anaerobic conditions as acidemia [1].

The two key factors to plaque formation are first their must be oral bacteria to attack food particles and elevate the pH. Second the pH must elevate above 7.6 to grow dental plaque that cause periodontal disease [2,3]. Therefore, such a study is necessary to establish the nature of the exact role in the induction and progression of the periodontal disease.

2. MATERIALS AND METHODS

Materials- Mouth Mirror
Dental Explorer (No.17/23)
Cotton Plier
UNC-15
Face Mask
Gloves
Diclosing Agent
Eppendroff tubes
pH meter

Inclusion criteria:

1. Systemically healthy individuals aged between 25-54 years.
2. Patients suffering from Stage 1 and Stage 2 Periodontitis (2017 Classification) were included in the study.
3. Patient willing to give informed consent were included in the study.
4. No usage of antibiotics in the preceding 6 months of the study.
5. No history of periodontal therapy 6 months prior to the study.

Exclusion criteria:

1. Patients with conditions like Diabetes mellitus, hypertension, atherosclerosis and other systemic diseases known to affect periodontal status.
2. Females with Pregnancy and lactating mothers
3. Patients with deleterious habits like alcohol consumption, tobacco habits and any other adverse habits.
4. Patients who have received any surgical or non surgical periodontal therapy in past 6 months.
5. Patients who have received any antimicrobial therapy in past 3 months.
6. Patients suffering from Salivary Gland Diseases.

Procedure:

Unstimulated Saliva is collected at the first visit when patient reports to the OPD for NSPT.

Clinical Parameters are recorded and NSPT is performed for the patient. Post 14 days of the treatment, saliva is collected and analysed for pH and clinical parameters are recorded again. pH is determined using a pH meter. Data is collected and statistically interpreted. Clinical Prameters recordings include Gingival Index, Plaque Index and Oral Hygiene Index-Simplified [4,5].
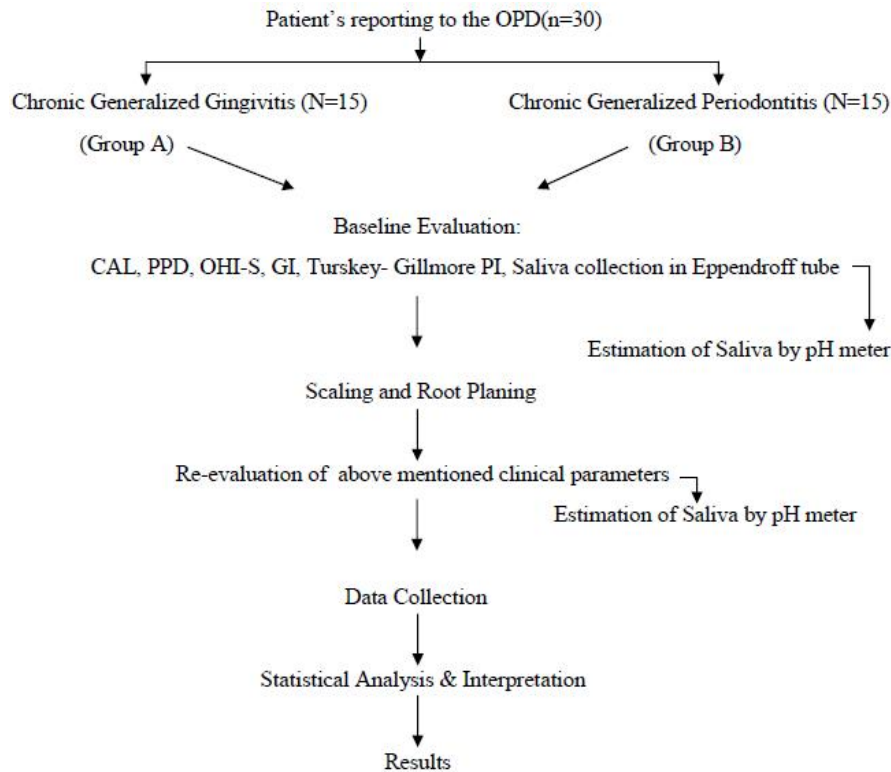
Fig. 1. Showing the pH meter
*CAL – Clinical Attachment Level
** PPD – Probing Pocket Depth

3. RESULTS

In this study, 50 subjects were evaluated for indices, periodontal parameters and pH levels before and after scaling and root planning.

Result were statistically analysed using t-test and Wilcoxon test. It was seen that there was clinically significant difference in gingival index (Graph 1), oral hygiene indices (Graph 2), plaque indices (Graph 3) and periodontal parameters post SRP which suggests improvement in periodontal condition and reduction in inflammatory markers (Table 1).

Difference in ph of saliva was also seen post SRP suggesting reduction in microbes which cause saliva to be alkaline thus high Ph, but difference was not statistically significant which may be due to less sample size (Table 1).

4. DISCUSSION

Gingivitis and periodontitis are the most prevalent chronic inflammatory conditions that affect as much as 80% of the adult population [6]. The activation of patient's host response liberates a myriad of metabolic byproducts at the interface between the tooth and the periodontal pocket which leads to the release of destructive cellular enzymes, cytokines, chemokines and other mediators of tissue destruction [7,8]. There are numerous markers in saliva which have been proposed and used as diagnostic tests for periodontal disease but the diagnostic tests should demonstrate sensitivity and specificity. It is improbable that a single marker will prove to be both sensitive and specific due to the complexity of the periodontal disease.

A saliva pH of 7.0 usually indicates a healthy dental and periodontal situation. At this pH, there is a low incidence of dental decay combined and little or no calculus. Therefore, stable conditions should basically be found in this environment.

A saliva pH below 7.0 usually indicates acidemia (abnormal acidity of the blood). If a chronic condition exists, the mouth is more susceptible to dental decay, halitosis and periodontitis. Chronic

acidemia can be a causative factor for a multitude of diseases affecting the whole body.

A saliva pH above 7.0 usually indicates alkalinity. Excessive alkalinity can bring about the same anaerobic conditions as acidemia, but it is much rarer condition.

Takahashi et al. [9] concluded in their study that the periodontopathogens grow in a mildly acidic pH. This is in accordance to our result for pH of chronic periodontitis.

Fujikawa et al. [10] studied the correlation between the pH level and the microflora in periodontal pockets in the various stages of periodontal disease. A change in pH level was seen in deep pockets or severe gingival inflammation. A close correlation was seen between salivary and crevicular pH. The pH level was significantly positively related with the proportion of coccoid forms, but was negatively correlated with the proportion of motile organisms that are reported to be related with periodontal disease.
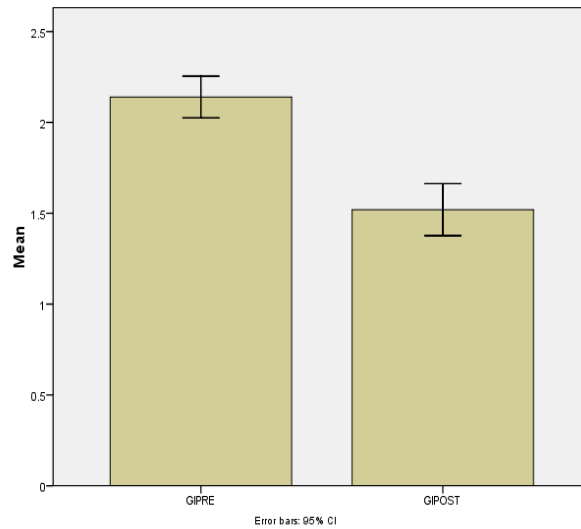
Graph 1. Gingival index- improvement post SRP
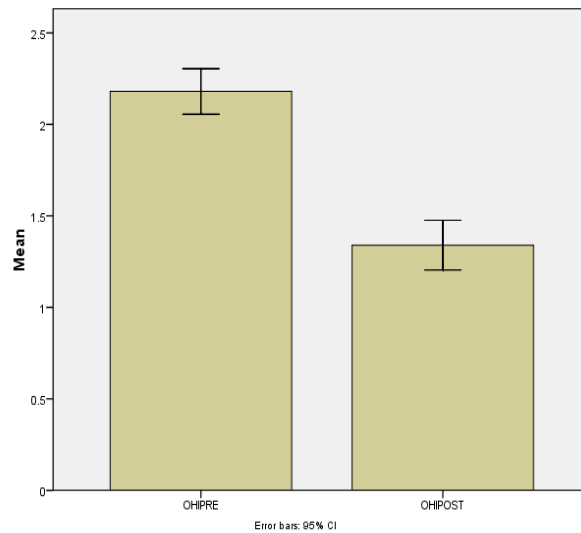
Graph 2. Oral hygiene index simplified- improvement post SRP
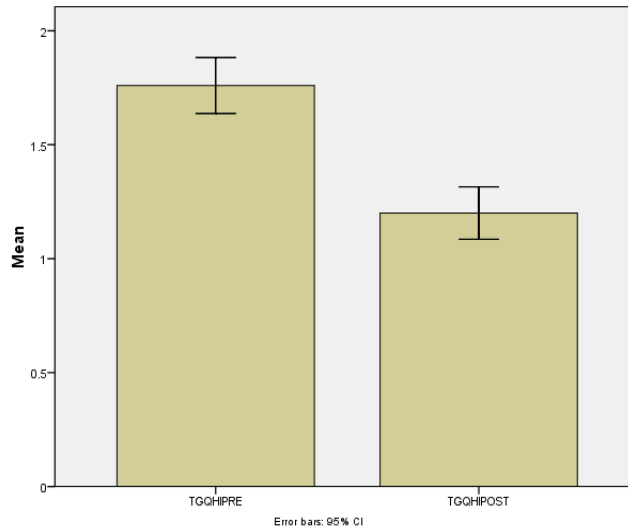
Graph 3. Plaque index- improvement post SRP

Table 1. Significance of pre and post levels

	Parameters	Mean	Standard Dev.	Significance
1	GI PRE – POST	.333	.488	.019 *
2	TGQHI PRE-POST	-.667	.488	.000*
3	OHI-S PRE - POST	.733	.594	.000*
4	PPD PRE -POST	.50667	.29391	.000*
5	CALPRE -POST	.47067	.47152	.002*
6	SALIVARY Ph PRE –POST	.153	.787	.463 NS

*-Significant, NS- Non Significant

Galgut [11] conducted a study to investigate any possible correlations between pH and gingivitis and periodontal pockets. Correlations between pH and gingivitis were not identified, but significant correlations between pH and periodontal pockets were evident.

Thus, this study establishes the importance of scaling and root planing in controlling periodontal disease before hand using Non-Surgical therapy and the value of salivary pH as an important and easy chair-side tool for diagnosis of periodontal diseases.

5. CONCLUSION

Saliva is a fluid that is easy to obtain, contains locally and systemically derived indicators of periodontal disease, and thus could form the basis for a patient-specific periodontitis diagnostic examination. During periodontal therapy, saliva may be used as a prognosis measure. When compared to healthy groups, there is a link between saliva pH and periodontal diseases, according to the limitations of this report. Salivary pH was more alkaline in patients with chronic generalised gingivitis than in those with clinically stable gingiva. The salivary pH was more acidic in patients with chronic generalised periodontitis than in the control group. This may have diagnostic value in the future, but more comprehensive studies with larger sample sizes, microbiological analysis and ions in the salivary sample are needed to draw definite conclusions.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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