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RESEARCH ARTICLE

COMPARATIVE EVALUATION OF THE EFFECTS OF SCALING AND ROOT PLANING WITH 0.2% LOCAL HYALURONIC ACID AND DIODE LASER THERAPY ON GLYCEMIC CONTROL IN TYPE II DIABETIC PATIENTS WITH CHRONIC PERIODONTITIS

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Abstract

Aim: The present study was to evaluate if use scaling and root planing with Hyaluronic acid and diode laser therapy has effect on glyceemic control in type II diabetic patients with chronic periodontitis.

Methodology: A total number of 20 patients aged 35-65 years, visiting the outpatient department of Periodontics, St. Joseph dental college, Eluru, were enrolled for this clinical study. Group A consisted of 10 patients who underwent scaling and root planing with local application of Hyaluronic acid. Group B consisted of 10 patients who underwent scaling and root planing with adjunctive use of laser decontamination.

Results: Results of the study showed that there was reduction in the HbA1c levels in both the groups and was more prominent in Group A (Scaling and Root planing + Hyaluronic acid).

Conclusion: It can be concluded that both the groups showed clinically significant outcome and that local application of hyaluronic acid showed significant improvement in HbA1C levels at the end of 6 months.

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Introduction:-

Periodontitis is an inflammatory disease of the periodontium that elicits an immuneresponse in turn resulting in loss of supporting structures of the teeth.

Diabetes mellitus is a systemic disease with several complications affecting both the quality and length of life, one of which is periodontal disease.

Southerland et al suggested that periodontitis and diabetes have a common pathogenesis involving an increased inflammatory response at local and systemic level. Patients with inflammatory periodontal diseases commonly have elevated serum levels of pro inflammatory cytokines, while patients with diabetes have hyperinflammatory immune cell that can exacerbate the elevated production of pro inflammatory cytokines. This has the potential to increase insulin resistance and makes it more difficult for the patient to control diabetes.

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The pathogenesis is initiated by bacterial attack in the presence of local or systemic factors and host mediated response contributing to tissue destruction through the release of proteolytic enzymes, reactive oxygen species (ROS) and free radicals. Free radicals like superoxide anion, hydroxyl, hydrogen peroxide, nitrous oxide, hypochlorous acid damage cell membranes and associated biomolecules. Periodontal pathogen can induce ROS overproduction and thus cause collagen degradation and periodontal cell breakdown. When ROS are scavenged by antioxidant there can be reduction of collagen degradation. Hence antioxidants are emerging as prophylactic and therapeutic agents. It can be delivered by topical, systemic or through dentrifice and it has been shown to cause significant improvement in gingivitis, periodontitis and reduction in oxidative injury.

Association of diabetes mellitus (DM) and periodontal disease (PDD) is well- documented in literature, in which plausible biological mechanism associated with capillary dysfunction has been identified¹. Persons with diabetes mellitus (DM) are at greater risk of developing PD. Type 2 diabetes is characterized by hyperglycemia, peripheral resistance to the action of insulin, and eventual destruction of insulin producing β -cells in the pancreas. Not only is it more prevalent in this population, but also the progression of symptoms, in a more aggressive and more rapidly setting mode. The function of immune cells, including neutrophils, monocytes and macrophages is often altered in cases of diabetes. Neutrophilic adherence, chemotaxis and phagocytosis are changed, inhibiting an adequate defense against bacteria in the periodontal pouch and significantly increasing the destruction of the periodontium.

It is well known that mechanical therapy alone provides an excellent clinical response in most of the patients but scaling and root planing (SRP) alone may not be effective in elimination of complete pathogenic organisms. In some cases administration of local and systemic chemotherapeutic agents yields good prognosis or combination of mechanical and chemical agent provides good recovery.

Hyaluronic acid (HA) is a naturally occurring linear polysaccharide of the extracellular matrix of connective tissue, synovial fluid, and other tissues. HA has shown anti-inflammatory, anti-oedematous, and anti-bacterial effects for the treatment of periodontal disease, which is mainly caused by the microorganisms present in subgingival plaque³.

In recent years, the use of LASER radiation has been expected to serve as an alternative or an adjunctive treatment to conventional, mechanical periodontal therapy. Various advantageous characteristics, such as haemostatic effects, selective calculus ablation, or bactericidal effects against periodontopathic pathogens, might lead to improved treatment outcomes⁴.

The glycated haemoglobin (HbA1c) test has been suggested as an alternative screening test for Type 2 diabetes. HbA1c levels represent a 2–3-month average of blood glucose concentrations. The accuracy of HbA1c analysis may be influenced by the presence of haemoglobinopathy or renal failure. HbA1c measurement is quicker and more convenient.

HbA1c can be measured at any time of the day regardless of the duration of fasting or the content of the previous meal⁵.

An attempt will be made through this study to evaluate and compare the efficacy of administering 0.2% hyaluronic acid locally and application of Diode laser as an adjunct to scaling and root planing and the beneficial role of both in treating chronic periodontitis.

Materials and Methods:-

Total number of 20 type II diabetes mellitus patients with clinically diagnosed chronic periodontitis were obtained from Out Patient Department of Periodontology at St. Joseph dental college, Eluru.

Method of collection of data:

The patients for the study were selected based on the following criteria –

Inclusion criteria:

Subjects with age group of 35 to 65 years with chronic generalised periodontitis having pockets measuring 5-7mm and HbA1c baseline level with 6% - 7% in known diabetics.

Exclusion criteria:

Patients with systemic disorders other than diabetes that could influence the course of periodontal disease and had undergone periodontal therapy for past 6 months. Patients who are pregnant and lactating mothers. Habit of tobacco chewing and smoking with trauma and infection

Methodology:-

A total number of 20 patients aged 35-65 years, visiting the outpatient department of Periodontics, St. Joseph dental college, Eluru, were enrolled for this clinical study based on the inclusion and exclusion criteria as listed above. At the first visit, after explaining about the study an informed consent was obtained, a detailed history was recorded on the demographic data, medical history, gingival and periodontal findings.

The study was carried out in one experimental group and one control group. The patients were allotted to these groups sequentially.

Patients were divided into two groups :

1. Group 1(10 patients): received one stage full mouth scaling and root planning(FMSRP) +0.2%hyaluronic acid intrasulcularly.
2. Group 2(10 patients): received FMSRP + diode laser for pocket decontamination

Periodontal Examination:

Clinical examination consisted of recording case history and intraoral examination was done for all 20 patients by a single examiner. On screening day printed performa was used to collect the data of patients for intraoral examination. Baseline HbA1c level was recorded.

Periodontal health status was assessed using Plaque Index given by Silness and Loe (1964), Gingival Index by Loe and Silness (1963). Periodontal destruction was assessed by relative attachment loss and probing pocket depth. Occlusal stents were made for each patient. Periodontal pocket depth was measured from the crest of marginal gingiva to the base of the pocket. Relative loss of attachment was measured as the distance between the fixed point on the stent and the base of the pocket. Both the measurements were recorded using Michigans graduated probe.

After recording all parameters at the baseline, full mouth scaling and root planing using ultrasonic scalers followed by hand instruments was performed.

After selecting the site, depending on the group, 0.2% hyaluronic acid gel was applied intrasulcularly. The gel was applied into the deepest portion of periodontal pocket by means of a thin rounded tip needle or laser decontamination was carried out depending on the group.

Standardized oral hygiene instructions will be given, modified bass method will be demonstrated.

Clinical Re-evaluation of treated sites will be assessed at 1 month ,3month and 6th month.

Results:-

The present study was to evaluate if use of photodynamic therapy along with scaling and root planing improved glycemic control and periodontal health compared to scaling and root planing alone in patients with type II diabetes.

So the study sample consisted of 20 patients both male and female with age ranging from 35 to 65 years. Selected patients were given informed consent prior to clinical examination and they were divided into 2 groups.

Group A and B:

Group A(n=10)-Scaling and root planning+ 0.2%hyaluronic acid intrasulcularly

Group B(n=10)-scaling and root planning + diode laser for pocket decontamination

Table 1:- And figure 1 shows intra group comparison of mean HBA1C levels at various interval. Both the Groups showed statistically significant difference in mean HBA1C in all 3 intervals. Within Group B marked reduction was

seen from baseline to 6 months compared to Group A.

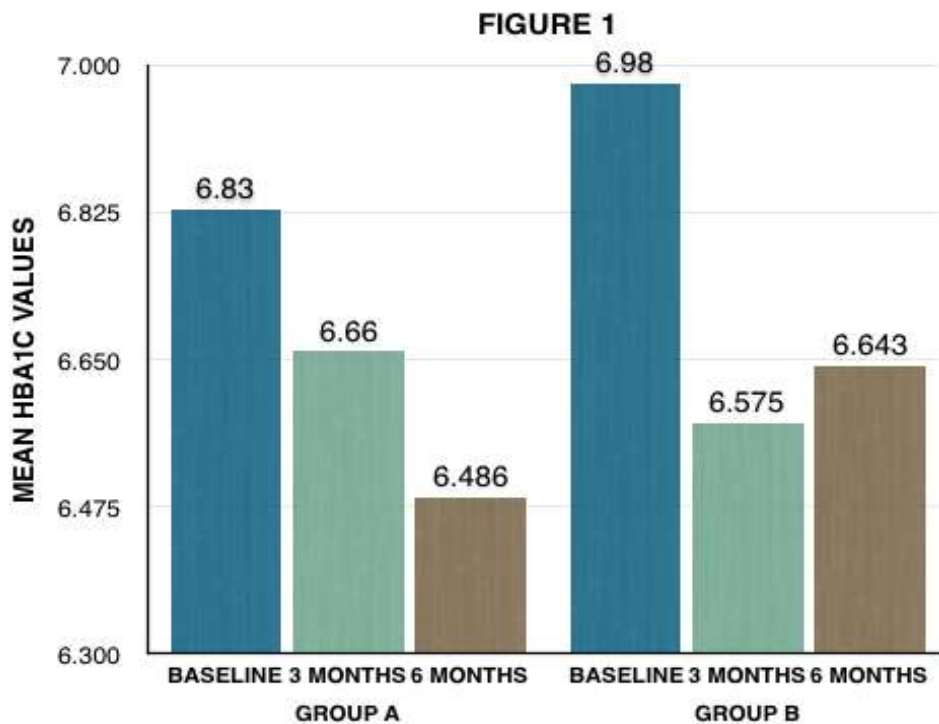
		N	Mean	Std.deviation	P value
Group a	Baseline	10	6.830	.4968	0.004*
	3 months	8	6.660	.6071	
	6 months	7	6.486	.6149	
Group b	Baseline	10	6.980	.4417	0.002*
	3 months	8	6.575	.5203	
	6 months	7	6.643	.5159	

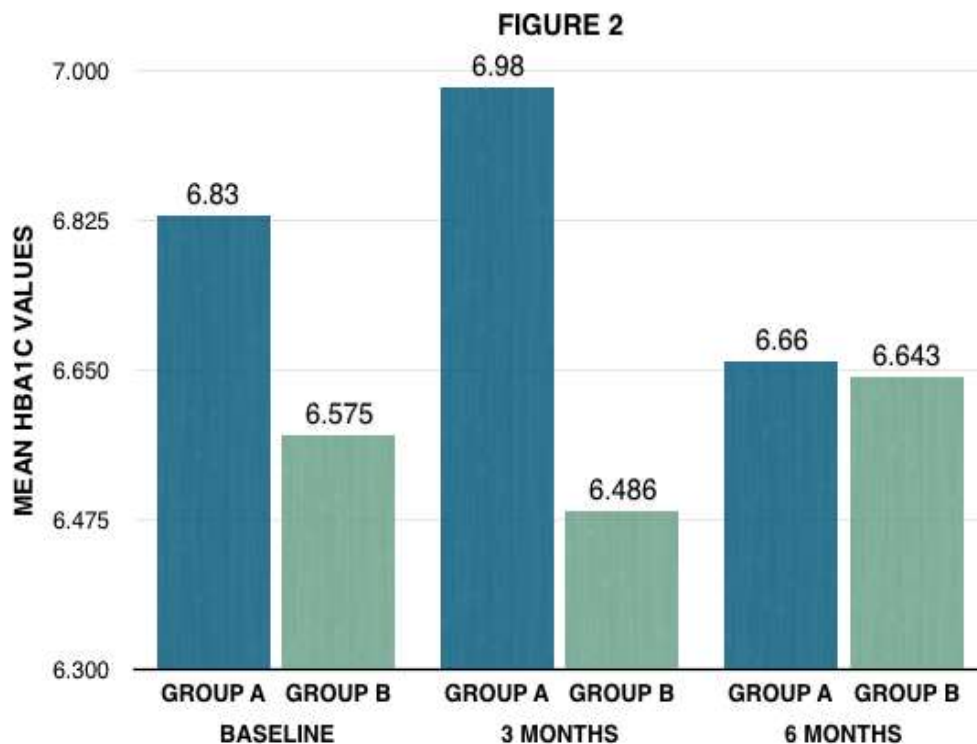
Table 2:- And figure 2 shows intergroup comparison of mean HBA1C levels showed marked reduction of mean value in 3 months and 6 months but no statistically significant difference was noted. Group A showed consistent reduction after 6 months.

		N	MEAN	STANDARD DEVIATION	P VALUE
Baseline	GROUP A	10	6.830	.4968	0.75
	GROUP B	10	6.980	.4417	
3 months	GROUP A	8	6.600	.6071	0.99
	GROUP B	8	6.575	.5203	
6 months	GROUP A	7	6.486	.6149	0.63
	GROUP B	7	6.643	.5159	

Table 3:- Shows both the groups showed significant reduction in all the periodontal parameters evaluated.

			Mean diff	P value
Plaque index	6 months	Group A v/s Group B	-0.010	0.84
Gingival index	6 months	Group A v/s Group B	0.47	0.027
PPD	6 months	Group A v/s Group B	1.00	0.010
Relative Attachment loss	6 months	Group A v/s Group B	1.00	0.010





Discussion:-

Diabetes mellitus (DM) is a systemic disease with several major complications affecting both the quality and length of life. One of these complications is periodontal disease (periodontitis).

Nishimura et al. stated that periodontal disease represents subclinical inflammation. The recent data have indicated that periodontitis is associated with a moderate systemic inflammatory response⁶. In another study it was suggested that both diabetes and periodontitis have a relatively high incidence in the general population and current studies tend to support the higher incidence and severity of periodontitis in patients with DM⁷. Southerland et al. suggested that periodontitis and diabetes share a common pathogenesis involving an increased inflammatory response at the local and systemic level⁸. Patients with inflammatory periodontal diseases have elevated serum levels of proinflammatory cytokines. The patients with diabetes have hyperinflammatory immune cells that promote the elevated production of proinflammatory cytokines that has the potential to increase insulin resistance and makes it more difficult for the patient to control diabetes⁹.

Studies have provided evidence to support the assertion that periodontal infection has an adverse, yet modifiable, effect on glycaemic control. An RCT by al-Mubarak et al. on 52 patients with either type 1 or type 2 diabetes, compared the use of ultrasonic scaling and root planning along with the use of subgingival water irrigation. There was no significant decrease in HbA1c levels in either group, although there was an improvement in the periodontal status of both groups¹⁰. Christgau et al. reported that mechanical therapy did not affect the levels of HbA1c in poorly controlled diabetic patients¹¹. Wesfelt et al. also found that HbA1c levels did not change¹². On the other hand, Stewart et al. suggested that there was a significant improvement in glycaemic control in type 2 diabetes patients following periodontal therapy¹³. Rodrigues et al. also suggested that periodontal therapy improved glycaemic control in patients with type 2 DM¹⁴.

According to Dag et al all periodontal parameters and serum TNF- α levels were significantly decreased three months after the nonsurgical periodontal therapy when compared to the baseline values. The HbA1c values were markedly decreased only in well-controlled diabetic patients. They found no significant differences in the periodontal parameters or TNF- α levels at baseline and after three months between the two groups. Although non-surgical periodontal therapy eliminates local or systemic infection and inflammation via decrease in TNF- α , it is insufficient to significantly reduce HbA1c levels without strict glycaemic control in poorly controlled diabetic patients in a short

period of time¹⁵.

The present study showed that Group A showed significant reduction when compared to Group B for plaque index, gingival index, PPD and relative attachment level at 6 months.

Conclusion:-

From the observation of this study, it can be concluded that both the groups showed clinically significant outcome and Group A showed significant improvement in HBA1C levels at the end of 6 months.

Long term evaluation is required to assess the validity of the procedure with a larger sample size and longer follow ups for clinical implementation of suitable modality that can be used as an adjunct along with scaling and root planing for better glycemic control (HBA1C) as well as for the improvement of periodontal parameters like plaque index, gingival index, pocket probing depth and relative attachment loss.

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