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Study Of Enzymatic Biomarkers To Evaluate Periodontal Severity

Amanthi Ganapathi
I year Student,BDS
Saveetha dental college and hospitals
No:162,PH road,
Chennai-600077.

V.Vishnupriya
Associate professor,
Department of Biochemistry
Saveetha dental college and hospitals
No:162,PHroad,
Chennai-600077.

R.Gayathri
Associate professor,
Department of Biochemistry
Saveetha dental college and hospitals
No: 162, PH road,
Chennai-600077.

Abstract:

Aim: To study the enzymatic biomarkers and to evaluate periodontal severity

Objective: The activity of enzyme like LDH & CPK in whole unstimulated saliva.when compared with normal control provides good insight of periodontitis.

Background: Periodontitis is chronic inflammatory state owing to bacterial infection of gingival tissue. It is characterized by persistent inflammation, annihilation of connective tissue matrix and running of alveolar bone.Periodontitis is diagnosed by measured probing depths of the gingival cervice, bleeding on probing clinical attachment level, plaque index, gingival index and radiographic analysis. Second by these enzymes diagnostic parameters are excellent to asses when significant level of damage has occurred & also determines the assessment of ongoing disease.

Reason: The enzymes selected for study are the biochemical marker for screening of periodontitis.

INTRODUCTION

Periodontitis is an inflammatory disease that affects the connective tissue that supports bone around the teeth. It is widely accepted that the initiation and the progression of periodontitis are dependent on the presence of virulent microorangsims capable of causing disease. Although the bacteria are initiating agents in periodontitis,the host response to the pathogenic infection is critical to disease progression[1-3].The second most common oral disease next to dental caries are the periodontal disease which are considered to be inflammatory disorder that damaged tissue through the complex interaction between periopathogens and the host defense system.[4].Usually periodontitis is diagnosed by probing the soft gum tissues and by making use of radiographs.periodontal diagnostic procedure play a significant role in providing location, and severity of the disease which serve as a basis for treatment.[5]Traditional diagnostic procedures were sufficient only to assess the disease history and not the current disease status advances in diagnostic research in oral and periodontal risk can be identified using biochemical markers[6]

Saliva is simple,non-invasive,readily available and easily collected without specialized equipment or personnel. For the past two decades, saliva has been increasingly evaluated as a diagnostic fluid for detecting breast cancer[7],oral cancer[8],caries risk[9],salivary gland disease[10],periodontitis[11],and systemic disorders such as hepatitis C and the presence of human immunodeficiency virus(HIV)[12].It may reflect the levels of therapeutic,hormonal,and immunologic molecules. Also in diagnostic purposes, salivary biomarkers proved more useful than serum analysis. Salivary biomarkers have also been used to examine the lifestyle factors, including smoking, on periodontal health. The diagnosis arrive phase of periodontal disease and the identification of patients at risk for active disease are challenges for clinical investigators and practioners alike. Researchers are confronted with the need for innovative diagnostic tests that focuses on the early recognition of the microbial challenge to the host [13].

Biomarker, or biological marker, is in general a substance used as indicator of biological state. In oral diagnostics, it has been a great challenge to determine biomarkers for screening, prognosis and evaluating the disease activity and the efficacy of therapy .An oral diagnostic tool, in general, should provide pertinent information for differential diagnosis, localization of disease and severity of infection. Traditional diagnostic measures, such as visual examintation, tactile appreciation, periodontal pocketdepth, attachment level, and plaque index, bleeding on probing and radiographic assessment of alveolar bone loss are still popular and universally used, however they are 50 years old and act as old diagnosis method. But with the help of biomarkers really detection is possible. Some of the biomarkers which can be used for early detection are aspartate , alanine aminotransferase(AST,ALP) creatine kinase(CK).It has been hypothesis that ALP could serve as a prognostic predictor, as an adjunct to the routine methods used for the determination of the disease activity and has a direct influence on the diagnosis, therapy and prognosis of periodontitis.[14]ALP is a calcium and phosphate binding protein and a phosphor- hydrolytic enzyme. It is a membrane bound glycoprotein produced by many cells such as polymorphonuclear leukocytes (PMNLs),osteoblasts,macrophages and fibroblasts within the area of the periodontium and gingival crevice.[15]

MATERIALS AND METHOD

The nominated patients include 15 persons, of sexes, aged 40-50, with periodontal disease and 15 healthy adult volunteers. Care was taken those patients who are Pregnant, lactating and females undergoing estrogen therapy were eliminated. And foremost care was taken that the patient does not have history of antibiotic, antimicrobial, and/or anti-inflammatory drug usage for last 6 months and any systemic disease, which may authorities the progess, course and prognosis of periodontal disease and/or periodontal therapy.

A complete periodontal examination, which included gingival index (GI), bleeding on probing (BOP), probing depth (PD) were done. Samples of unstipulated saliva, mixed saliva were taken directly after rinsing the mouth. It was taken care that the saliva samples were collected in sterile test tube [16].the lactose dehydrogenase (LDH) levels and Alkaline phosphatase (ALP) levels were estimated with the help of standard LDH and ALP kit respectively..LDH was measured using NAD analog by international federation of clinical chemistry. Alkaline phosphatase (ALP) is group of enzymes that spilt off a terminal phosphate group from a organic ester in alkaline solution. ALP is measured by Kinetic method recommended by international federation of clinical chemistry.

RESULTS

The acquired results have shown that the activity of appraised enzyme in saliva of the patients with periodontal severity was significantly elevated in relation to the control group.

TABLE:-1 GROUP STATISTICS FOR LDH

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
LDH	PERIODONTAL DISEASE	15	529.80	88.959	22.969
	NORMAL	15	292.60	62.627	16.170

TABLE:-2 INDEPENDENT SAMPLE TEST FOR LDH

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
LDH	Equal variances assumed	2.061	.162	8.444	28	.000	237.200	28.090	179.660	294.740
	Equal variances not assumed			8.444	25.141	.000	237.200	28.090	179.364	295.036

FIG-1:-LEVEL OF LACTOSE DEHYDROGENASE IN NORMAL PATIENTS AND PATIENTS WITH PERIODONTAL DISEASE

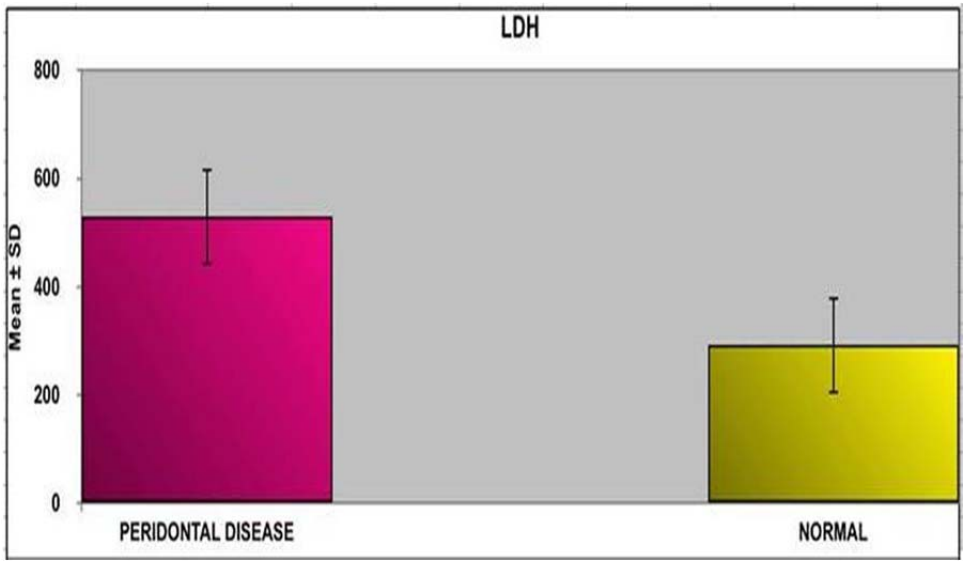


TABLE:-3 GROUP STATISTICS FOR ALP

Group Statistics

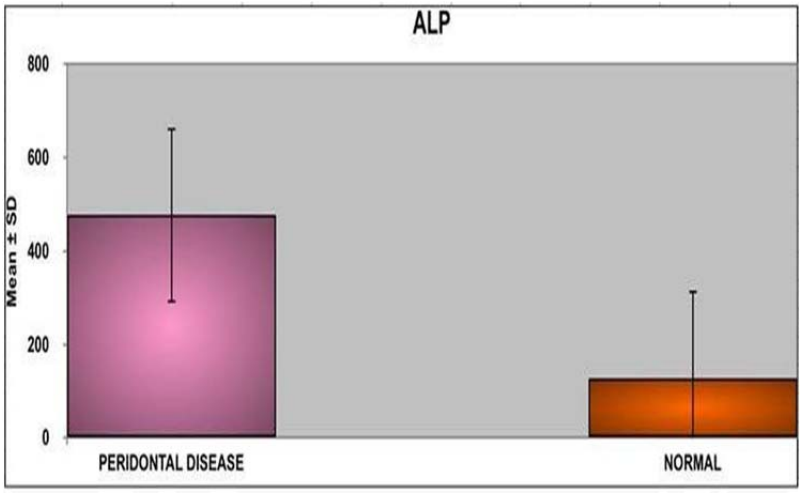
	GROUP	N	Mean	Std. Deviation	Std. Error Mean
ALP	PERIODONTAL DISEASE	15	476.87	186.978	48.277
	NORMAL	15	127.87	60.693	15.671

TABLE:-4 INDEPENDENT SAMPLE FOR ALP

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ALP	Equal variances assumed	9.752	.004	6.876	28	.000	349.000	50.757	245.029	452.971
	Equal variances not assumed			6.876	16.918	.000	349.000	50.757	241.872	456.128

FIG-2:-LEVEL OF ALKALINE PHOSPHATE IN NORMAL PATIENTS AND PATIENTS WITH PERIODONTAL DISEASE.



DISCUSSION

Detection of laboratory tests of saliva is most commonly used for the evaluation of many other systemic disorders. The proper diagnosis of periodontal disease depends on the clinical and radio graphical parameters. But these parameters will present only bounded information about the sites of risk for future periodontal breakdown. Many enzymes have been used as a biomarker to assess the progression of periodontal diseases such as (LDH, ALP).In healthy person, their activities are of normal level. But in the case of periodontitis the cells become damaged, due to oedema or destruction of the cellular membrane as a result of which there will be increased release into the gingival crevicular fluid and saliva where their activity can be measured.These enzymes can be used as biochemical markers of the functional condition of periodontal tissues [16]. Among the intracellular enzymes some have received considerable attention as suitable biomarkers of active periodontal destruction. They are Asparatate aminotransferase (AST), Alanine aminotransferase (ALT), Gamma glutamyl transferase (GGT), β-glucuronidase, Elastase, Lactate dehydrogenase (LDH), Creatinine kinase (CK), Alkaline phosphatase (ALP), and Acid phosphatase (ACP)[17].In this activity the level of LDH is significantly higher in patients having periodontitis than the normal healthy individuals, shown in table-1 and 2. Lactate dehydrogenase (LDH) is a omnipresent enzyme which plays a remarkable role in the clinical findings of pathologic processes. Salivary LDH was found to be the most applicable enzyme for the screening of periodontitis. Studies show that increased LDH activity in the saliva of patients with increased probing depth than in individuals with healthy periodontium.ALP is a intracellular enzyme which in present in most of tissues and organs, predomiently in bones. Increased activity in saliva is the reason behind the consequent destruction in alveolar bone. some of the studies also shows that increased activity of ALP in the acute phase of periodontal disease, and after the periodontal therapy, the activity of these enzymes are restored to the values which is found in healthy individuals .In the activity the level of ALP is significantly higher I patients with periodontitis than the healthy individuals, shown in table-3 and 4.

CONCLUSION

More notable research must be done to study the mechanism of action of salivary enzymes in periodontal diseases which provides information regarding new opportunities for the diagnosis and treatment.

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