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Estimation of Unstimulated Salivary Creatine Phosphokinase in the Patients with Periodontitis.

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Abstract:

Objective:
The main objective is to study the Creatinine Phosphokinase levels in patients affected with periodontitis. The disease has a direct effect in its levels which in turn leads to various complications.

Background:
Salivary diagnostics is an emerging field in proteomics. It uses salivary proteome for the prognosis, diagnosis and management of periodontal disease.
Creatinine Phosphokinase catalyses the conversion of creatine and consumes ATP to create phosphocreatine and ADP. ALP, AST and Creatinine Phosphokinase are stored in specific granules and secretory vesicles of the neutrophils and is mainly released during their migration to the site of infection. It is also present in bacteria within dental plaque. Intracellular enzymes are increasingly released from the damaged cells of periodontal tissues into the gingival crevicular fluid. Change in the enzymatic action reflect metabolic changes in the periodontium in inflammation.

Reason:
This helps in the study of enzyme in unstimulated saliva for valuing their importance as routine screening tool in diagnosis of periodontitis

Result:
The association of salivary CPK in periodontitis was assessed.

Keywords: Creatine phosphokinase,periodontitis,Biomarkers,saliva

INTRODUCTION:.

Periodontitis is a serious gum infection that damages the soft tissue and destroys the bone that supports your teeth. Periodontitis can cause tooth loss or worse, an increased risk of heart attack or stroke and other serious health problems. Periodontitis is common but largely preventable. Periodontitis is usually the result of poor oral hygiene. Brushing at least twice a day, flossing daily and getting regular dental checkups can greatly reduce your chance of developing periodontitis. It is a common inflammatory diseases which is multifactorial in origin.

(1). Periodontitis is caused by Microorganisms that adhere to and grow on the tooth's surfaces.

(2). Usually periodontitis is diagnosed by probing the soft gum tissues and by making use of radiographs. Periodontal probing may be inaccurate in recording the true pocket depth.

(3) Periodontal diagnostic procedures play a significant role in providing the clinicians useful information regarding the type, location, and severity of the disease which serve as a basis for treatment planning and provide essential data during periodontal maintenance and disease-monitoring phases of treatment.

(4) Traditional diagnostic procedures were sufficient only to asses the disease history and not the current disease status Advances in diagnostic research in oral and periodontal disease are moving toward methods whereby periodontal risk can be identified using biochemical markers.

(5) Clinical parameter such as probing pocket depth (PPD), gingival index GI, plaque index (PI), clinical attachment level (CAL), provide information on the severity of periodontitis but they do not measure disease activity, whereas microbiological tests, analysis of host response, and genetic analysis have been proposed in an effort to monitor and identify patients at increased risk for periodontitis.

(6) Creatine kinase (CK) also known as creatine phosphokinase (CPK) or phospho-creatine kinase is an enzyme expressed by various tissues and cell types. It is a protein that helps to elicit chemical changes in your body. CK catalyses the conversion of creatine.[8]Creatine phosphokinase (CPK) is an enzyme found mainly in the heart, brain, and skeletal muscle. Clinically, creatine kinase is assayed in blood tests as a marker of damage of CK-rich tissue such as in myocardial infarction (heart attack), rhabdomyolysis (severe muscle breakdown), muscular dystrophy, the autoimmune myositides and in acute renal failure.It is an enzyme expressed by various tissues and cell types.

(7) Analysis of inflammatory biomarkers in saliva could offer an attractive solution for the diagnosis of different systemic conditions in epidemiological surveys.

(8) An increasing number of specific molecular markers for different diseases, such as oral and breast cancer, cardiovascular diseases and human immunodeficiency virus (HIV) are being identified.

(9) Early detection of disease plays a crucial role in successful therapy. In most cases, the earlier the disease is diagnosed, the more likely it is to be successfully cured or well controlled.

MATERIALS AND METHOD:

A total of 30 subjects in the age group of 40-50 years visiting Saveetha dental college were assessed. Out of 30 subjects, 15 subjects affected with periodontitis and 15 subjects as a control group were included in this study.

Collection of the Salivary Sample :

Patients were advised that a very small amount of saliva will ooze into their mouth in un-stimulated state and that the objective of the test was to measure the rate of flow of this secretion. Saliva was collected at least 1 1/2 hr after eating. Un- stimulated whole saliva was collected by making the patient to sit in upright position at rest, bow their head and try not to move during the test. Immediately before the test begun, they were instructed to swallow any residual saliva that may be in their mouth. The saliva was allowed to accumulate for 2 min and then expectorated into the collecting vessel. If insufficient saliva was obtained then test may be conducted for a longer period of time often for 5 min. The procedure was done after getting consent from the patients

Estimation of CK:

CK is estimated by a modification of the IFCC method.CK reversibly catalyzes the transfer of a phosphate group from creatine phosphate to adenosine diphosphate (ADP) to give creatine and adenosine triphosphate (ATP) as products. The ATP formed is used to produce glucose-6- phosphate and ADP from glucose. This reaction is catalyzed by hexokinase (HK) which requires magnesium ions for maximum activity. The glucose- 6-phosphate is oxidized by the action of the enzyme glucose-6-phosphate dehydrogenase (G6P-DH) with simultaneous reduction of the coenzyme nicotinamide adenine dinucleotide (NADP) to give NADPH and 6-phosphogluconate. The rate of increase of absorbance at 340/660 nm due to the formation of NADPH is directly proportional to the activity of CK in the sample.

Creatine Phosphate + ADP+ATP + Glucose--------->G-6-P + NADP+CK HK,Mg2+ G6P-DH+Creatine+ ATP+ADP + Glucose-6-phosphate (G-6-P) 6-phosphogluconate + NADPH + H

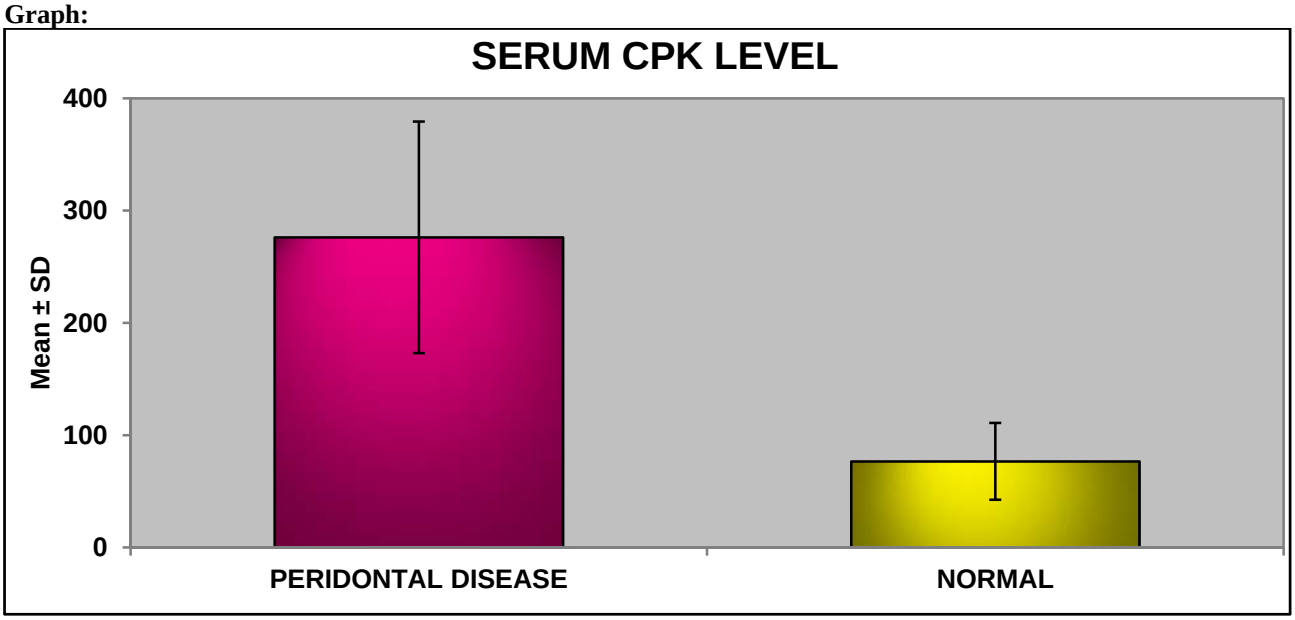
Statistics:

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
SERUM CPK	Equal variances assumed	10.076	.004	7.115	28	.000	199.533	28.045	142.086	256.981
	Equal variances not assumed			7.115	17.043	.000	199.533	28.045	140.375	258.692

RESULT AND DISCUSSION:

Graph:



The obtained results have shown that the activity of examined enzyme in saliva of the patients with periodontal disease was significantly higher in relation to the control.The mean of the control group was 76.7 and the patients with periodontitis was 276.2. There was almost four folds of increase in the value.For the evaluation of many systemic disorders diagnostic laboratory test of saliva are used.Diagnosis of periodontal disease relies primarily on clinical and radio graphical parameters.But only few information are obtained about sites at risks for future periodontal breakdown with these parameter.Many biomarkers in saliva are proposed ,has diagnostic test for periodontal disease which are normal in healthy person. Due to oedema , destruction of cellular membrane ,the cells become damaged in periodontitis. As a result of which the activity can be measured when there is an increased release in the gingival cervical fluid and saliva. Thus these enzymes are used as enzymatic biomarkers for the diagnosis of periodontitis.(3)The activities of these enzymes have been previously investigated in the gingival crevicular fluid which have closer contact with the periodontal tissue.The method of collecting the gingival crevicular fluid is hardly feasible in practice.(11)CK is an indicator of a higher level of cellular damage and their increased activity in gingival crevicular fluid and saliva is a consequence of their increased release from the damaged cells of soft tissues of periodontium and a reflection of metabolic changes in the inflamed gingiva.

Creatine kinase is an enzyme found in the heart, brain, skeletal muscle, and other tissues. Increased amounts of CK are released into the blood when there is muscle damage. The small amount of CK that is normally in the blood comes primarily from skeletal muscles.(12)

CONCLUSION:-

Qualitative changes in the composition of salivary biomarkers could have significance in the diagnosis and treatment of periodontal disease.(13)Biomarkers in saliva have the potential to be used for screening purposes in epidemiological studies(14).Salivary biomarkers represent a promising non-invasive approach for oral cancer detection,periodontitis and an area of strong research interest.(15)More research may be required to study the mechanism of action of salivary enzymes in periodontal disease which provides new opportunities in diagnosis and treatment protocol.

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