ejpmr, 2020,7(10), 629-631

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

COMPARISON OF SALIVARY BETA GLUCURONIDASE ACTIVITY IN CHRONIC PERIODONTITIS WITH OR WITHOUT DIABETES MELLITUS

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Article Received on 12/08/2020 **Article Revised on 02/09/2020** **Article Accepted on 23/09/2020**

ABSTRACT

Introduction: Various studies have been done to diagnose Periodontitis with the use of salivary analysis. The advantage of the method is that saliva is easily available. There are various markers of the periodontal diseases that are found in the fluid of saliva. Hence the present study was done to estimate the salivary beta Glucuronidase activity in patients diagnosed with chronic Periodontitis with and without diabetes mellitus. **Materials & Methods:** A total of 160 patients with age range of 30 to 70 years were included in the study. Both male and females were included. For saliva parameter estimation, 50 uml of saliva was collected in the standard and properly designated tubes. For the control the unionized distilled water was used. **Results:** There were 90 females and 70 males. When comparing the mean BG activity values between the groups, the mean BGA levels of Group IV (1.64 ± 0.39) was significantly higher than mean BGA levels of Group I, II, III. The P-value was < 0.05. The mean BGA levels of Group III (0.84 ± 0.30) was significantly higher than mean BGA levels of Group I, Group II at 5 % level. The p-value was < 0.05. **Discussion & Conclusion:** It is considered that salivary beta Glucuronidase is a potential biochemical marker of the tissue destruction. A positive correlation was found between the clinical periodontal diseases parameters and salivary beta Glucuronidase. There were increases in salivary beta Glucuronidase level in diabetic patients with periodontal diseases as compared to non diabetic patients with periodontal diseases.

KEYWORDS: Beta Glucuronidase, diabetes, periodontal diseases.

INTRODUCTION

Periodontium comprises of investing and supporting structures of the tooth. They are Gingiva, Periodontal ligament, Cementum and Alveolar bone. The inflammatory state of Periodontium is called Periodontitis, which is one of the most common oral diseases and is characterized by the loss of connective tissue attachment and bone around the teeth in conjunction with the formation of periodontal pockets due to the apical migration of the Junctional epithelium.[1] Periodontal diseases are a group of inflammatory disorders that result from the host response to sub-gingival plaque microorganisms. Inflammation leads to the accumulation of polymorphonuclear (PMN) leukocytes, macrophages, lymphocytes, and mast cells, which are important in protecting the body against infection.[2,3]

By the inflammatory response there was various enzymes that are released. Among the various enzymes released Beta Glucuronidase is the marker of primary granules released by neutrophils. Human β-glucuronidase is located in the lysosome during the lysosomal acid hydrolysis the Beta glucuroniase is released.[4] They are stored in azurophil granules. During periodontal disease occurrence they cause the degradation of the collagenous matrix. Owing to the research done in the past there is tremendous connection found between the Periodontitis and the diabetes. Various evidence have been found to support the above facts. There are more chances of diabetic patients to develop periodontist and gingivitis as compared to the healthy individuals.[5]

The examination of salivary fluid can play a very important role in clinical diagnosis of systemic diseases. Biomarkers found in saliva can assist in disease detection, management and progress.[6] Various studies have been done to diagnose Periodontitis with the use of salivary analysis. The advantage of the method is that saliva is easily available. There are various markers of the periodontal diseases that are found in the fluid of saliva. Hence the present study was done to estimate the salivary beta glucuronidase activity in patients diagnosed with chronic Periodontitis with and without diabetes mellitus.

MATERIALS AND METHODS

The present study was done in the department of periodontology, in the dental college. All the patients coming for the opd in the department were checked for periodontist and diabetes mellitus history. The institute ethical committee was informed about the study and the ethical clearance certificate was obtained from them, prior to the commencement of the study.

A total of 160 patients with age range of 30 to 70 years were included in the study. Both male and females were included. Patients with minimum of 12 teeth excluding the third molars were included in the study. All the included patients were devoid of any type of oral lesions. Patients having History of intake of non steroidal anti inflammatory drugs, immunosuppressive drugs, corticosteroids, antihypertensive drugs, antibiotic therapy and antiseptic therapy for the preceding six months, patient who have the habit of smoking and pregnant ladies were excluded from the study.

All the patients included in the study were divided into four groups as follows: group A: Healthy patients with no sign of oral diseases, group B: Patients having gingival inflammation sign in oral cavity, group C: Patients having the sign of chronic periodontal diseases, group D: Patients diagnosed with chronic periodontal diseases having history of diabetes.

For group A there is no sign of inflammation of gingival and having healthy Periodontium, in group B there is generalised marginal gingivitis but there is no loss attachment, for group C there is loss of attachment and having the pocket probing depth of more than 5 mm, for group D along with the probe depth of more than 5 mm there is more than 120 mg/dl random blood sugar or more than 90 mg/dl fasting blood sugar level. The following clinical parameters were recorded in all the patients: Probing depth, clinical attachment loss and gingival index. For the estimation of BG activity 5ml of unstimulated saliva was collected from all the patients in the autoclave glass tubes.

For saliva parameter estimation, 50 uml of saliva was collected in the standard and properly designated tubes. For the control the unionized distilled water was used. Phenolphthalein glucuronic acid was used as standard and patient's saliva was used as sample. With the use of micropipette, the 50 uml of saliva was taken in a cuvette. Phosphate buffer at pH 4.9 of quantity of 25nM and phenolphthalein glucuronic acid was added in the 50uml of saliva. The tube was intubated for one hour at 65 degree C. By adding 100 ul of 200 mM glycine buffer the reaction was terminated. With the help of spectrophotometer the intensity of red colour was measured. For the statistical analysis the mean values were compared between different study groups by one way ANOVA. In the present study, $p \leq 0.05$ was considered as the level of significance.

RESULTS

The present study was done with the aim to estimate the Salivary Beta Glucuronidase(β) activity in patients with Chronic Periodontitis with and without Diabetes mellitus. Total of 160 patients were included in the study. The study population was divided in the four groups as per the clinical outcomes. Males and females both were included in the study. There were 90 females and 70 males.

Table 1: Gender distribution of the study population.

Gender	No. of Participants
Males	70
Females	90
Total	160

The study population was divided in the following four groups, group A: Healthy patients with no sign of oral diseases, group B: Patients having gingival inflammation sign in oral cavity, group C: Patients having the sign of chronic periodontal diseases, group D: Patients diagnosed with chronic periodontal diseases having history of diabetes. Salivary beta glucuronidase activity was estimated in patients diagnosed with chronic Periodontitis with and without diabetes mellitus. The results of the study were analysed with the help of statistical analysis. The results was summarised in the table 2.

Table 2: Means of the salivary Beta Glucuronidase in all four groups

Groups	Mean ± Standard Deviation
A	0.09 ± 0.06
B	0.32 ± 0.23
C	0.84 ± 0.30
D	1.64 ± 0.39

When comparing the mean BG activity values between the groups, the mean BGA levels of Group IV (1.64 ± 0.39) was significantly higher than mean BGA levels of Group I, II, III. The P-value was < 0.05. The mean BGA levels of Group III (0.84 ± 0.30) was significantly higher than mean BGA levels of Group I, Group II at 5 % level. The p-value was < 0.05.

DISCUSSION

Diagnostic laboratory tests of the serum are routinely used in the evaluation of many systemic disorders. In contrast, the diagnosis of many periodontal diseases relies primarily on the clinical and radiographic parameters.[7] The strengths of these traditional tools are their ease of use, their cost effectiveness, and that they are relatively noninvasive, but these traditional diagnostic procedures are inherently limited, in that, only the disease history and not the current disease status and the sites at risk for future periodontal breakdown, can be assessed. One of the hallmarks of current periodontal research is the search for a diagnostic test to assess periodontal disease activity through potential biomarkers which would be more predictive.[8]

β Glucuronidase together with hyaluronidase is involved in the catabolism of proteoglycans. β Glucuronidase is an exoglycosidase that removes GlcUA from non reducing ends of tetrasaccharides or larger polysaccharides. Therefore, it contributes to non-collagenous matrix degradation in periodontal diseases. The association between Diabetes mellitus and Periodontal disease has been well documented by a wide spectrum of studies that have involved diabetic populations affected by various diabetes subtypes. The possibility of identifying a diabetic individual during a periodontal examination is therefore not unrealistic. Conversely, it would be beneficial to identify diabetic individuals at greater risk for periodontal disease.[9,10]

Our study consisted of 160 patients age ranging from 30-70 of both sex and they are divided into four groups. The mean BG activity of Group IV was significantly higher than Group III, II and I. Also there was a high level of salivary β glucuronidase in periodontitis patients compared to gingivitis and healthy controls. Even though, the salivary BG activity was present in healthy controls and gingivitis group; the values were significantly lesser than periodontitis group.[11] This shows that beta glucuronidase activity is related to attachment loss. The results were also similar with the study conducted in GCF by Layik et al., There was a low level of salivary BG activity in control patients that was similar to the study conducted in GCF by Lamster IB et al.[12]

CONCLUSION

It is considered that salivary beta Glucuronidase is a potential biochemical marker of the tissue destruction. A positive correlation was found between the clinical periodontal diseases parameters and salivary beta Glucuronidase. There were increases in salivary beta Glucuronidase level in diabetic patients with periodontal diseases as compared to non diabetic patients with periodontal diseases. Hence concluded that salivary beta Glucuronidase is the good predictor for the periodontal destruction in the oral cavity.

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