

ORIGINAL ARTICLE

STUDY OF SERUM CREATINE PHOSPHOKINASE LEVEL IN ORAL SQUAMOUS CELL CARCINOMA

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ABSTRACT:

Aim: to assess the alteration serum creatine phosphokinase level in different grades of oral squamous cell carcinoma.

Methods: twenty three patients with histopathologically diagnosed cases of oral squamous cell carcinoma and 23 age & sex matched healthy individuals ((group I), were randomly selected in present study. Incisional biopsy was performed from the clinically most representative areas and fixed in 10% natural buffer formalin, process and cut by rotary microtome to obtain paraffin sections of 5 microns. Each section was stained using Hematoxylin and Eosin stain. 2ml antecubital venous blood samples were collected from all subjects after fasting overnight and centrifuged for 5 min to obtain serum sample. **Results:** Serum CPK level when compared Between Group I(control) and Group II shows not significant result. When compared between Group I(control) and Group III and between Group I(control) and Group IV, it shows significant results. **Conclusion:** There are definite underlying biochemical changes in serum of patients with oral Squamous cell carcinoma. As well as potential relation between elevated serum CPK level and oral cancer can be a useful biochemical marker for assessing such life threatening malignant lesion

Key words: Oral cancer, Oral squamous cell carcinoma, Patients, Serum creatine phosphokinase

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INTRODUCTION:

Cancer is one of the leading causes of adult deaths worldwide. Oral cancer is a serious problem in many countries. It accounts for significant mortality and is also responsible for extensive disfigurement, loss of function, behavioral changes, financial and sociologic hardship.¹ The survival rate oral malignancies are less than 50%, though treated; hence it is very important to recognize these malignancies at the earliest stage.²

Creatine phosphokinase is an enzyme expressed by various tissues and cell types. The diagnostic and prognostics value of creatine phosphokinase as biomarker in other systemic disease are well documented. Creatine phosphokinase is an enzyme

which is released due to muscle damage in different systemic diseases. Hence this is used as biomarker to find out the extent of muscle damage or the progress of a disease.³

An early detection all these help to improve the mortality and quality of life of the patient.⁴ Previously alteration of serum CPK level was assessed in breast cancer and small cell lung cancer, prostate cancer etc. Though previous investigations have reported serum creatine phosphokinase possibility as a serum marker for early detection in many other cancers, their possible association with oral squamous cell carcinoma is still not clear.

Thus present study was conducted to assess the alteration serum creatine phosphokinase level in different grades of oral squamous cell carcinoma.

MATERIAL AND METHOD:

23 patients with histopathologically diagnosed cases of oral squamous cell carcinoma and 23 age & sex matched healthy individuals ((group I), were randomly selected in present study. Subjects who have any systemic illness and have tissue damage other than primary lesion were not included in study. In addition, none of the participants was receiving any drug that could influence circulating CK level.

Incisional biopsy was performed from the clinically most representative areas and fixed in 10% natural buffer formalin, process and cut by rotary microtome to obtain paraffin sections of 5 microns. Each section was stained using Hematoxylin and Eosin stain.

2 ml antecubital venous blood samples were collected from all subjects after fasting overnight and centrifuged for 5 min to obtain serum sample. The analysis of CPK enzyme level in serum was performed within 3 hours by commercially available standardized methods.

Histopathological diagnosed oral squamous cell carcinoma cases were divided into three groups according to Broder’s (1920) classification as well differentiated (group II), moderately differentiated (group III) and poorly differentiated squamous cell carcinoma (group IV).⁵

STATISTICAL ANALYSIS:

Statistical analysis was done using SPSS version 15. Difference between mean CPK level in different group was analyzed using one way ANOVA test. Confidence interval and level of significance was set at 95% and 5% respectively.

RESULTS:

Table 1: Correlation of serum CPK level in control group and grades of oral squamous cell carcinoma

Groups	Group I (Control group)	Group II (Well differentiated)	Group III (Moderately differentiated)	Group IV (Poorly differentiated)
No of samples	25	6	6	7
Mean CPK level	95.32± 14	97.13 ± 21	99.54± 35	100.03± 35

P value between Group I and Group II	0.09
P value between Group I and Group III	0.05*
P value between Group I and Group IV	0.002*
P value between Group II,III,IV	0.07

* indicates statically significant difference at p=0.05

Control group (Group I) comprised of 23 healthy individuals with age ranging from 22 to 40 (mean 30.11±4.71)while study group comprising of 23 histopathologically diagnosed oral squamous cell carcinoma cases consisted 8 cases of well differentiated carcinoma (Group II), 9 cases of moderately differentiated carcinoma (Group III) and 6 cases of poorly differentiated carcinoma (Group IV) with mean age group of 34.33±3.53.

Serum CPK level when compared Between Group I(control) and Group II shows not significant result. When compared between Group I (control) and Group III and between Group I(control) and Group IV, it shows significant results. Between different grades of oral cancer (between Group II, Group III, Group IV) serum CPK level shows changes but statistically it was non-significant.

DISCUSSION:

Tumor markers present in serum, tissue and other body fluids during neoplastic process are of clinical value in the management of patients with various body cancers.⁶

In recent years, detection of molecular markers is being emphasized. Body fluids such as saliva, blood, urine and others are used for early diagnosis, predicting prognosis and monitoring the progression of diseases. Blood based tests is more appealing; with the view of its ease, economic advantage and possibility to repeat sampling.⁷

Creatine Phosphokinase (CPK) belongs to transferases group of enzymes, present in muscle, brain and other tissues that catalyzes the reversible conversion of creatine to phosphocreatine consuming ATP and generating ADP.⁸

There are four known CK isoenzymes distributed in the cytoplasm and mitochondria of the cells. The cytoplasmic CK isoenzymes, namely, CK-MB (myocardial type), CK-BB (brain type) and CK-MM (muscle type), are composed of the dimer of two immunologically distinct M (muscle) and B (brain) polypeptide subunits, which are so called because they have been isolated from skeletal muscle and brain tissue respectively. In addition to these, there is another type called mitochondrial CK, which can exist in two forms, the ubiquitous form and the sarcomeric form.⁹

Though previous studies have proposed its possibility as a marker for early detection in many cancers, their possible association with oral carcinoma is still not ascertained clearly. Thus the need was felt to conduct a study to check the efficacy of CPK as serum marker.

The exact reason for the enzyme release from the tissue remains obscure. However the mechanism of focal nature of muscle fiber damage may provide an anatomic basis for understanding enzyme release. It can be due to release of the enzyme from the altered tissue specifically from muscular tissue as a result of tissue injury, myopathy or trauma, hypoxia or severe exertion, or it may be related to depletion of intracellular high energy phosphate and/or mechanical disruption.¹⁰

Previously various studies were performed to assess the any alteration in serum CPK levels and different carcinomas. Pretlow TG et al., observed increased levels of serum CPK in benign prostatic hyperplasia when compared to prostatic carcinomas.¹¹ Tsung SH et al., reported significantly reduced levels of serum CPK in tumours of GI tract.¹² Akihiko Usui et al., in their study on various lung carcinomas found increased CPK-BB levels and proposed this iso-enzyme to be a marker for monitoring clinical course.¹³

Apart from different other pathology, Various studies were performed regarding serum CPK level and Oral pathologies like, Chen et al., in their study on hamsters observed increased serum CPK in premalignant lesions than OSCC. Joshep et al, was observed non-significant alteration in serum CPK level between control and oral submucous fibrosis.³ Spoorthi et al.,observed significant association between serum CPK level and Oral Premalignant lesions.⁴ So present study was planned to assess any correlation between serum CPK level and oral cancer.

In the present study, Serum CPK Level was compared between control and different grades of Oral squamous cell carcinoma as well as serum CPK level was also compared between histological grades well, moderate and poorly differentiated carcinoma.

Present study shows significantly rise in serum CPK level in poorly differentiated Squamous cell carcinoma (Group IV) compared to control. Same result also observed when serum CPK level was compared between control and moderately differentiated squamous cell carcinoma where CPK level was significantly higher in moderately differentiated carcinoma (Group III) which is shown in Table 1. When serum CPK level was compared between control and well differentiated squamous cell carcinoma (Group II), alteration in CPK level was observed but it was not significant which is shown in Table 1. Non-significant difference was noted in serum CPK level among different histological grades of oral squamous cell carcinoma. So, present study shows positive correlation of serum CPK level and Oral squamous cell carcinoma.

CONCLUSION:

From this study it can be concluded that there are definite underlying biochemical changes in serum of patients with oral Squamous cell carcinoma. As well as potential relation between elevated serum CPK level and oral cancer can be a useful biochemical marker for assessing such life threatening malignant lesion. Based on finding of this study, it seems that measuring serum CPK level have clinical implication and diagnostic value in oral cancer.

REFERENCES:

1. Wood NK, Goaz PW. Differential Diagnosis of Oral and Maxillofacial Lesions. 5th ed. St. Louis, Missouri: Elsevier; 2006. p. 587
2. K. Venkatakrishna, V. B. Kartha. HPLC-LIF for early detection of oral Cancer. CURRENT SCIENCE, February 2003 : 84(4) 25.
3. Joseph BB, George S. Level of serum creatine phosphokinase in oral submucous fibrosis - a biochemical study, Int J Cur Res Rev 2015 7 (13)
4. Spoorthi B R ,Vidya M. serum Creatinine Phosphokinase : A Potential diagnostic tool for oral premalignant lesions ?- A histopathological biochemical study. Indian J Stomatol.2011;2 (2): 86-90.
5. Joshi PS, Chougule M, Dudanakar M, Golgire S. Comparison between salivary and serum lactate dehydrogenase levels in patients with oral leukoplakia and oral squamous cell carcinoma - A pilot study. Int J Oral MaxillofacP athol 2012;3:07-12.
6. Lohe VK, Degwekar SS, Bhowate RR, Kadu RP, Dangore SB. Evaluation of correlation of serum lipid profile in patients with oral cancer and precancer and its association with tobacco abuse. J Oral Pathol Med.2010;39:141-8.
7. Kaplan LA, Pesce AJ, Kazmierczak SC. Protein Isoforms: Isoenzymes and Isoforms : Clinical Chemistry: Theory

- Analysis, Correlation: 4th edn. St. Louis Mosby. 2003;1081- 82.
8. Lang H, Wurzburg U. Creatine kinase, an enzyme of many forms. ClinChem 1982;28:1439-47.
 9. Young. Plasma creatine kinase after the marathon- a diagnostic dilemma. Brit J Sports Med 1984;18:269-72.
 10. Pretlow TG 2nd, Whitehurst GB, Pretlow TP, Hunt RS, Jacobs JM, McKenzie DR, McDaniel HG, Hall LM, Bradley EL Jr., Decrease in creatine kinase in human prostatic carcinoma compared to benign prostatic hyperplasia. Cancer Res. 1982 Nov;42(11):4842-8.
 11. Tsung SH. Total CK activity and isoenzyme patterns in normal and neoplastic tissue of gastrointestinal tract. J Clin Pathol. 1982 Feb;35(2):204-6.
 12. Usui A, Fujita K, Imaizumi M, Abe T, Inoue K, Matumoto S, Kato K. Determination of creatine kinase isozymes in sera and tissues of patients with various lung carcinomas. Clin Chim Acta. 1987 Apr 15;164(1):47-53.
 13. Lin LM¹, Chen YK., Creatine kinase isoenzymes activity in serum and buccal pouch tissue of hamsters during DMBA-induced squamous cell carcinogenesis. J Oral Pathol Med. 1991 Nov;20(10):479-85.

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