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Salivary gamma glutamyl transpeptidase as a biomarker in patients with oral squamous cell carcinoma and precancerous lesions

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Abstract---Background: Gamma-glutamyl transpeptidase (GGT) is a membrane-bound enzyme, which is not normally expressed in oral epithelial tissues. The present study evaluated salivary gamma-glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions. Materials & Methods: 78 subjects were divided into 3 groups of 26 each. Group I were healthy subjects, group II had precancerous lesions and group III had oral squamous cell carcinoma (OSCC). In all subjects, unstimulated saliva samples were collected and were subjected to estimation of

gamma-glutamyl transpeptidase enzyme. Results: Group I had 13 males and 13 females, group II had 20 males and 6 females and group III had 18 males and 8 females. The mean GGT level in group I was 16.4 IU/L, in group II was 52.6 IU/L and in group III was 73.2 IU/L. The difference was significant ($P < 0.05$). Conclusion: Salivary gamma-glutamyl transferase level was higher increased in patients with OSCC and premalignant lesions, thus can be used effectively as a tumor marker.

Keywords---gamma-glutamyl transferase, precancerous lesions, squamous cell carcinoma.

Introduction

A neoplasm is an abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that of normal tissues, and which persists in the same excessive manner after cessation of the stimuli which evoked the change. The common term used for malignant tumors is cancer. The word cancer is derived from the Latin word for crab.¹

Oral cancer most commonly occurs in middle-aged and older individuals, although a disturbing number of these malignancies is also being documented in younger adults in recent years. Oral cancer can be divided into three categories: carcinomas of the oral cavity proper, carcinomas of the lip vermillion, and carcinomas arising in the oropharynx.² Intraoral and oropharyngeal tumors are more common among men than women, with a male: female ratio of over 2:1. However, the disparity in the male: female ratio has become less pronounced over the past half century, probably because women have been more equally exposing themselves to known oral carcinogens such as tobacco and alcohol.³

Tumor markers are biologic or biochemical substances produced by tumors cells and secreted into blood, other body fluids, or body tissues of some patients with certain types of cancer is higher than normal amounts.⁴ A tumor marker may be produced by the tumor itself, or by the body in response to the presence of cancer.⁵ Gamma-glutamyl transpeptidase (GGT) is a membrane-bound enzyme, which is not normally expressed in oral epithelial tissues. Furthermore, GGT has been shown to increase considerably in various malignant tumors, precancerous lesions and conditions.⁶ The present study evaluated salivary gamma-glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions.

Materials and Methods

The present study consisted of 78 subjects of both genders. They were enrolled in the study after obtaining their written consent. Data such as name, age, gender etc. was recorded. A thorough oral examination was carried out. They were divided into 3 groups of 26 each. Group I were healthy subjects, group II had precancerous lesions and group III had oral squamous cell carcinoma (OSCC). In all subjects, unstimulated saliva samples were collected and were subjected to

estimation of gamma-glutamyl transpeptidase enzyme. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I Distribution of patients

Groups	Group I	Group II	Group III
Subjects	Healthy	Precancerous lesions	OSCC
Males	13	20	18
Females	13	6	8

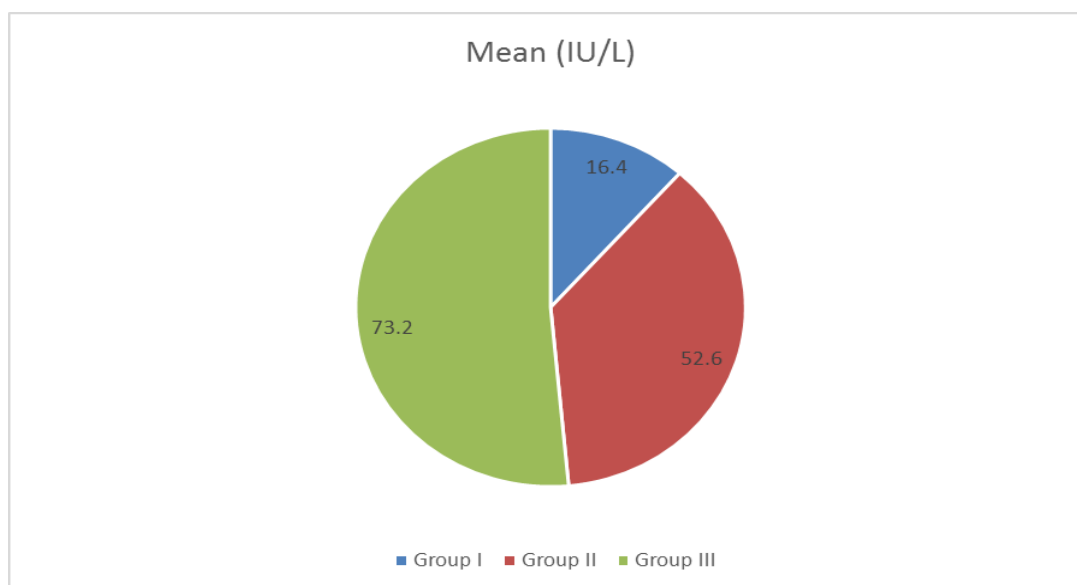
Table I shows that group I had 13 males and 13 females, group II had 20 males and 6 females and group III had 18 males and 8 females.

Table II Assessment of gamma-glutamyl transpeptidase enzyme in all subjects

Groups	Mean (IU/L)	P value
Group I	16.4	0.04
Group II	52.6	
Group III	73.2	

Table II, graph I shows that mean GGT level in group I was 16.4 IU/L, in group II was 52.6 IU/L and in group III was 73.2 IU/L. The difference was significant ($P < 0.05$).

Graph I Assessment of gamma-glutamyl transpeptidase enzyme in all subjects



Discussion

The sixth most common malignancy in the world is oral carcinoma. It accounts for approximately 4% of all cancers and 2% of all cancer deaths worldwide. In India, it accounts for 50 to 70% of all cancers diagnosed.⁷ Early detection is necessary for the prompt treatment.⁸ Most commonly, laboratory diagnostic procedures are advised for early diagnosis. It involves the analysis of cellular and chemical constituents of blood.⁹ Various other biologic fluids are utilized for the diagnosis of disease. One of them is saliva. Saliva offers some distinctive advantages.¹⁰ Whole saliva can be collected noninvasively and by individuals with limited training. No special equipment is required for collection of the fluid. The noninvasive nature of collection, the direct contact to the oral tissue, and the relationship of enzymes between oral fluids and blood levels make saliva a useful and promising specimen.¹¹ The present study evaluated salivary gamma-glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions.

We found that group I had 13 males and 13 females, group II had 20 males and 6 females and group III had 18 males and 8 females. Farooqui et al¹² highlighted the use of gamma-glutamyl transpeptidase (GGT) as salivary enzyme tumor marker and assessed the activity and concentration of GGT in precancerous and cancer patients and compare it with the normal control. In this study, salivary GGT was analyzed in 75 cases. The selected patients were divided into three main groups as group I (controls with normal health), group II (patients with precancerous lesions and conditions), and group III (patients with oral cancer lesions). All the selected individuals were analyzed for salivary GGT. A significant difference was observed between control and precancerous groups with GGT values at 5% level of significance. The mean GGT value is significantly higher in precancerous group as compared with control group.

We observed that mean GGT level in group I was 16.4 IU/L, in group II was 52.6 IU/L and in group III was 73.2 IU/L. Mujawar et al¹³ assessed the activity and concentration of GGT in precancerous and cancerous patients in comparison with normal patients and also to assess its efficacy as an effective tumor marker. The study population comprised a total of 75 patients who were categorized into three groups as normal patients (25 cases in Group A), patients with precancerous lesions (25 patients in Group B) and patients with oral squamous cell carcinoma (25 cases in Group C). 5 ml of whole unstimulated saliva collection was done, it was centrifuged at 3000 rpm for 15 min and the supernatant thus obtained was used for the estimation of GGT levels. The detection was done by photometric method reading the absorbance at 405 nm. Group A patients had values of GGT ranging from 4 to 30 U/L with a mean of 16.7 ± 1.94 U/L. Group B had activity of GGT ranging from 39 to 65 U/L with a mean of 50.4 ± 1.67 U/L. In group C, the evaluated GGT activity was between 53 and 86 U/L and the mean was 70 ± 2.37 U/L. Correlations between Group A and Group B and between Groups A and C showed a statistically significant relation.

Conclusion

Authors found that salivary gamma-glutamyl transferase level was higher increased in patients with OSCC and premalignant lesions, thus can be used effectively as a tumor marker.

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