Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.comdoi: 10.21276/jamdsrIndian Citation Index (ICI) Index Copernicus value = 91.86

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Assessment of salivary gamma glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions

[1]Ashish Chandra, [2]Anmol Bagaria, [3]Pinky Pavithran, [4]Nandini Chandla, [5]Anmol Razdan, [6]Aishwarya Sinha

[1]BDS, MDS Oral Medicine and Radiology, IDST Kadrabad, Uttar Pradesh, India;
[2]BDS, MSc., FAGE, PGDAC, FFA, Private Practitioner, Mumbai, Maharashtra, India;
[3]PG 3rd year, Department of Oral and Maxillofacial Pathology, Malabar Dental College and Research Centre, Vattamkulam, Kerala, India;
[4]BDS Intern, Dr Harvansh Singh Judge Institute of Dental Sciences and Hospital, Chandigarh, India;
[5]PG 3rd year, Oral Medince and Radiology, I.T.S CDSR Muradngar Ghaziabad, Uttar Pradesh, India;
[6]BDS 4th year, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh, India

ABSTRACT:
Background: 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. The present study was conducted to assess salivary gamma glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions. **Materials & Methods:** 90 subjects of both genders were divided into 3 groups. Group I were with normal oral cavity findings without any lesion, group II with precancerous lesions and Group III with diagnosed cases of oral squamous cell carcinoma. Salivary sample thus taken was subjected for GGT test by the Szasz methodology using Gamma GT kit. Saliva samples, thus, collected were subjected for the isolation of gamma-glutamyl transpeptidase enzyme, separation of GGT and its estimation. **Results:** Group I comprised of 15 males and 15 females, group II had 20 males and 1-0 females and group III had 22 males and 8 females. The mean GGT level in group I was 17.5 IU/L, in group II was 50.2 IU/L and in group III was 72.4 IU/L. The difference was significant (P< 0.05). **Conclusion:** Salivary gamma-glutamyl transferase activity can be used effectively as a tumor marker.
Key words: gamma-glutamyl transferase, Tumor, squamous cell carcinoma

Received: 16 November, 2021 Accepted: 20 December, 2021

Corresponding author: Ashish Chandra, BDS, MDS Oral Medicine and Radiology, IDST Kadrabad, Uttar Pradesh, India

This article may be cited as: Chandra A, Bagaria A, Pavithran P, Chandla N, Razdan A, Sinha A. Assessment of salivary gamma glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions. J Adv Med Dent Scie Res 2022;10(1):77-79.

INTRODUCTION

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.[1] From an epidemiological and clinicopathological perspective, “oral cancer” can be divided into three categories: carcinomas of the oral cavity proper, carcinomas of the lip vermilion, and carcinomas arising in the oropharynx. Intraoral and oropharyngeal tumors are more common among men than women, with a male: female ratio of over 2:1.[2] 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]

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.[4] Thus, the present study was conducted to assess the activity of salivary GGT in normal, precancerous and cancerous patients and also to evaluate its role as a biomarker. Non-invasive techniques using salivary biomarkers can be of help in its early detection and monitoring.[5] These molecular biomarkers reflect abnormal cell components, and the use of molecular medicine is profoundly changing the approach to diagnosis and treatment modality. Enzyme activity changes occurring in tissue, body fluids and serum can be potentially used as parameters

in the diagnosis of some types of cancer.[6] The present study was conducted to assess salivary gamma-glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions.

MATERIALS & METHODS

The present study comprised of 90 subjects of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups. Group I were with normal oral cavity findings without any lesion, group II with precancerous lesions and Group III with diagnosed cases of oral squamous cell carcinoma. Salivary sample thus taken was subjected for GGT test by the Szasz methodology using Gamma GT kit. Saliva samples, thus, collected were subjected for the isolation of gamma-glutamyl transpeptidase enzyme, separation of GGT and its estimation. 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
Status	Normal	precancerous lesions	OSCC
M:F	15:15	20:10	22:8

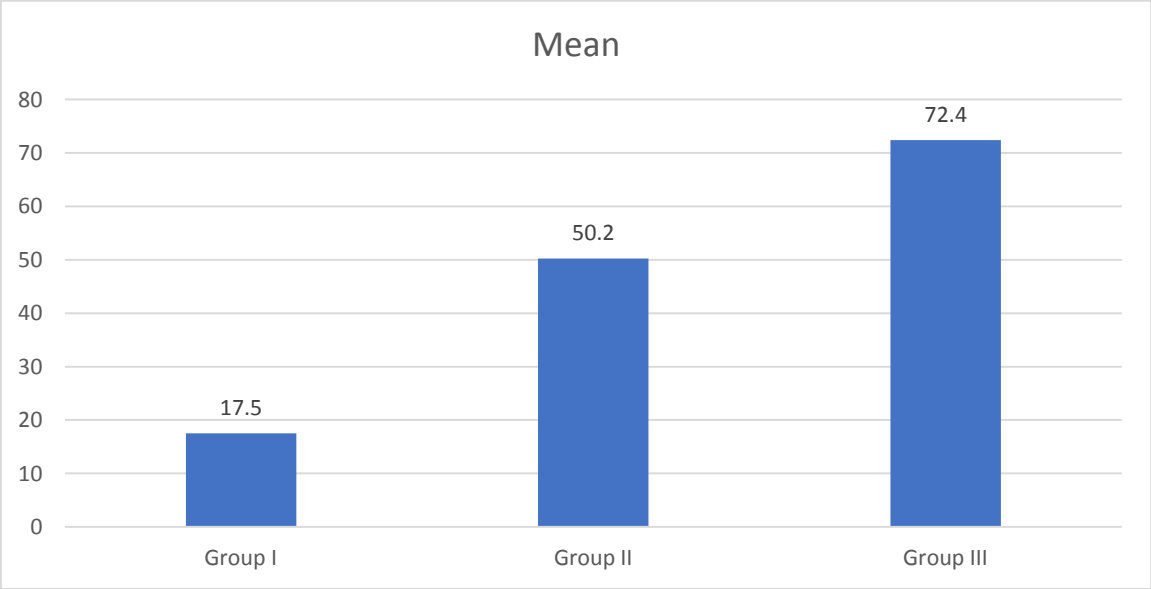
Table I shows that group I comprised of 15 males and 15 females, group II had 20 males and 1-0 females and group III had 22 males and 8 females.

Table II Comparison of gamma-glutamyl transpeptidase enzyme

Groups	Mean	P value
Group I	17.5	0.001
Group II	50.2	
Group III	72.4	

Table II, graph I shows that mean GGT level in group I was 17.5 IU/L, in group II was 50.2 IU/L and in group III was 72.4 IU/L. The difference was significant (P< 0.05).

Graph I Comparison of gamma-glutamyl transpeptidase enzyme



DISCUSSION

The strong association between cancers of the oral cavity and pharynx with tobacco use is well established. Epidemiological studies show that the risk of developing oral cancer is five to nine times greater for smokers than for nonsmokers, and this risk may increase to as much as 17 times greater for extremely heavy smokers of 80 or more cigarettes per day.[7] The percentage of oral cancer patients who smoke (approximately 80 percent) is two to three times greater than that of the general population. In addition, treated oral cancer patients who continue to smoke have a two to six times greater risk of developing a second malignancy of the upper aerodigestive tract than those who stop smoking.[8] Marijuana use is also considered to be a potential risk factor and may be partly responsible for the rise in oral cancers seen among young adults. However, further epidemiological studies are necessary to confirm the purported association of marijuana and oral cancer in younger patients.[9] The present study was conducted to assess salivary gamma-glutamyl

transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions.

In present study, group I comprised of 15 males and 15 females, group II had 20 males and 1-0 females and group III had 22 males and 8 females. Mujawar et al[10] 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 30U/L with a mean of 16.7 ± 1.94U/L. Group B had activity of GGT ranging from 39 to 65 U/L with a mean of 50.4 ± 1.67U/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 ($P < 0.005$).

We found that mean GGT level in group I was 17.5 IU/L, in group II was 50.2 IU/L and in group III was 72.4 IU/L. A number of studies have suggested that oral lichen planus, especially the erosive form, may be associated with an increased cancer risk, although other investigators have questioned the strength of this association. Iron deficiency anemia in combination with dysphagia and esophageal webs (known as Plummer-Vinson or Paterson-Kelly syndrome) is associated with an elevated risk for development of carcinoma of the oral cavity, oropharynx and esophagus. Immunosuppression appears to predispose some individuals to an increased risk for oral cancer. Carcinomas of the lip have been reported in a number of kidney transplant patients receiving immunosuppressive medications, and oral carcinomas have been documented in young AIDS patients.[11]

Glutathione also acts as a coenzyme. It reduces the oxygen toxicity by destroying the reactive oxygen compounds produced within cells. Degradation of glutathione takes place through the actions of gamma-glutamyl transpeptidase, gamma-glutamyl cyclotransferase, 5-oxoprolinase and dipeptidase. Renal GGT prevents excretion of glutathione from the body by initiating cleavage of this tripeptide into its constituent amino acids, which can then be reabsorbed. GGT is a cell surface enzyme that hydrolyzes the gamma-glutamyl bond of extracellular reduced and oxidized glutathione, initiating their cleavage into glutamate, cysteine (cystine) and glycine. GGT is normally expressed on the apical surface of ducts and glands, salvaging the amino acids from glutathione in the ductal fluids.[12]

CONCLUSION

Authors found that salivary gamma-glutamyl transferase activity can be used effectively as a tumor marker.

REFERENCES

1. Muddugangadhar BC, Sangur R, Rudraprasad IV, Nandeeshwar DB, Kumar BH. A clinical study to compare between resting and stimulated whole salivary flow rate and pH before and after complete denture placement in different age groups. J Indian Prosthodont Soc 2015;15:356-66.
2. Sajjan AR, Hinchigeri SB, Datta KS. Biochemical properties of gamma-glutamyl transpeptidase in human submandibular gland. Clin Chim Acta 1991 ;203:409-10.
3. Tabak LA. A revolution in biomedical assessment: The development of salivary diagnostics. J Dent Educ 2001;65:1335-9.
4. Zimmermenn BG, Park NJ, Wong DT. Genomic targets in saliva. Ann NY Acad Sci 2007;1098:184-91.
5. Vasudevan DM, Sreekumari S. Textbook of Biochemistry for Medical Students. 1st ed. New Delhi: Jaypee Brothers Medical Publishers (p) Ltd.; 1995. p. 77, 424.
6. Hanigan MH, Frierson HF. Immunohistochemical detection of gamma-glutamyl transpeptidase in normal human tissue. J Histochem Cytochem 1996 Oct; 44:1101-8.
7. Hanigan MH. Gamma-glutamyl transpeptidase: Redox regulation and drug resistance. Adv Cancer Res. 2014;122:103-41.
8. Tietz NW. Fundamentals of clinical chemistry. 1st ed. Philadelphia: Published by W. B. Saunders; 1987.p. 621-5.
9. Jiménez-Alonso J, Jaimez L, Barrios L, Pérez-Jiménez F, García A, Bejarano R, et al. Gamma-glutamyltransferase and alkaline phosphatase in the serum and saliva of patients with hepatic tumors and hepatic cirrhosis. Rev Esp Oncol 1984;31:315-9.
10. Mujawar SJ, Suchitra G, Kosandal KA, Choudhari S, Inamdar NA, Ahmed KB. Evaluation of salivary gamma-glutamyl transpeptidase as a biomarker in oral squamous cell carcinoma and precancerous lesions. J Oral Maxillofac Pathol 2020;24:584.
11. Calderon-Solt L, Solt DB. Gamma-glutamyl Transpeptidase in precancerous lesions and carcinomas of oral, pharyngeal and laryngeal mucosa. Cancer 1985; 56:138-43.
12. Gerald K, Stephanie S. Gamma-Glutamyl transferase: A predictive biomarker of cellular antioxidant inadequacy and disease risk. Dis Markers 2015:2015:18.