ISSN : 0974 - 7427 Volume 6 Issue 6

Trade Science Inc.

BIOCHEMISTRY
An Indian Journal

Regular Paper

BCAIJ, 6(6), 2012 [177-179]

Serum glutathione-S-transferases activity in esophagus cancer patients receiving chemotherapy

N.R.Hazari[1]*, R.S.Ambad[2], A.P.Thorat[1]

[1]Department of biochemistry Government medical college, Aurangabad. Pin no. 431001, Maharashtra, (INDIA)

[2]Department of biochemistry, S.R.T.R.medical college, Ambajogai, Maharashtra, (INDIA)

Received: 9th September, 2012 ; Accepted: 9th October, 2012

ABSTRACT

Purpose: - To analyze the level of serum glutathione-s-transferases (GSTs) activity in patients with esophagus cancer.

Methods: - For the study total 50 cases of carcinoma of esophagus of stage II and stage III (receving chemotherapy) were selected. All patients were clinically and histological diagnosed. 40 age and sex matched healthy normal subjects selected as control. GSTs activity was measured in the serum of control group (n=40) and in patients with esophagus cancer (n=50).

Results: - Mean GSTs activity in serum was significantly higher in patients with esophagus cancer as compared to control group ($p<0.001$). The patients of stage III of esophagus cancer had significantly elevated activity of serum GSTs than stage II.

Conclusion: - Measurement of serum GSTs activity may be useful as a tumor marker in esophagus cancer. Alterations in serum GSTs levels might be helpful to predict the response of chemotherapy.

KEYWORDS

GST;
Esophagus cancer;
Chemotherapy.

INTRODUCTION

Several modifiable environmental, dietary and habitual risk factors have been associated with development of gastrointestinal cancers, causal relationship between tobacco usage and gastrointestinal malignancies have been demonstrated for several decades. Dietary factors that have been closely associated with esophagus cancer are betel nut chewing, hot foods and beverages.

Tobacco, which is widely used in India, is a major cause of the cancer of the upper digestive and respiratory tract[1,2].

Upper gastrointestinal cancers are highly lethal diseases unless diagnosed early. Efforts for early diagnosis of esophagus cancer have been spread over the past two decades with limited success and tumor markers are appealing tools for this purpose.

In the recent years glutathione-S-transferases (GSTs) have attracted interest in the field of cancer because their activity is readily increased in chemically induced tumors[3,4]. They have a considerably important role in detoxification of carcinogens. GSTs are present in many species and tissues of the human gas-

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trointestinal tract. Likewise, the human GSTs were found to be over expressed in most of the tumors[4,5]. GSTs expression in response to tumor formation is probably a resistance mechanism by which cells can survive, and the source of plasma enzyme is mainly transformed cells with over expression of GSTs. Indeed GSTs are one of the enzyme systems induces by anticarcinogens and thus can prevent tumor formation. GSTs have also been suggested to play an important role in multiple drug resistance in cancer chemotherapy[6]. In this study, serum GSTs activity has been measured in different stages of esophageal cancer patients.

MATERIAL AND METHODS

For the study total 50 cases of carcinoma of esophagus of stage II and stage III were selected. All patients were clinically and histological diagnosed. All patients with stage-III received chemotherapy including cisplastin, cyclophosphamide and doxorubicin.

For control total 40 normal healthy age and sex matched persons were selected. Subjects with esophageal cancer and those without any evidence of any type of cancer participated in this study as listed in TABLE 1.

TABLE 1 : Distribution for control and patients

	Number of subjects (male/female)	Age-range (years)
Control	40 (24/16)	40-70
Esophagus cancer	50 (32/18)	40-75
Stage II	25 (17/8)	42-69
Stage III	25 (15/10)	40-75

TABLE 2 : Comparison of serum GST activity in control with esophagus cancer

	No. of cases	Mean ± SD	No. of cases (values> normal)	P value
Control	40	5.36±0.59	40(100%)	-
Esophagus cancer	50	11.80±2.40	46 (92%)	<0.001

Values are expressed in IU/L

Collection of samples

5 ml fasting blood sample were collected in plain bulb. Serum was separated and used to estimation of glutathione-s-transferase. Serum GSTs activity, using 1-chloro-2, 4 dinitrobenzene (purchased from Sigma company) as substrate, was measured according to the procedure described by Habig et al[7].

Data were expressed as mean ±SD. Mean values were assessed for significance by unpaired student -t-test. Probability values $p < 0.05$ were considered statistically significant.

RESULTS

AS shown in TABLE 2 mean serum GSTs activity (mean±SD) in control using CDNB as substrate was 5.36±0.59 IU/L. Serum GSTs activity of esophageal cancerous patients was 11.80±2.40 IU/L. GSTs activity was significantly higher in esophageal cancer patients than control ($p<0.001$). The 46 of 50 patients of esophageal cancer had elevated activity of serum GSTs.

TABLE 3 shows the activity of serum GSTs in different stages of esophageal cancer patients. The activity of serum GSTs in stage-III patients was significantly elevated than stage-II patients ($p<0.001$).

TABLE 3 : Serum GSTs activity in various stages of esophagus cancer

	No. of cases	Mean ± SD	p-value
Control	40	5.36± 0.59	-
Stage-II	25	10.03±1.13	< 0.001
Stage-III	25	13.56 ± 0.85	< 0.001*

Values are expressed in IU/L; * Stage-II vs. Stage-III

DISCUSSION

The ability of the GSTs to provide cellular protection against a wide variety of xenobiotics makes this enzyme family an attractive candidate biomarker of both cancer susceptibility and chemopreventive activity[3,6].

In the present study serum GSTs was significantly higher ($p<0.001$) in patients with esophagus cancer as compared to those obtained from normal healthy control group (TABLE 2). Similar findings reported by G.S.Mohammadzadeh et al[4]. The increased activity of total GSTs in serum can be due to over expression of isoenzymes of GST in tumor tissues. GST-π class was found to be over expressed in most of tumor[8,9]. However, there are doubts over the use of total GSTs activity as a marker for all types of tissues. The GSTs activity of plasma represents a non invasive biomarker of the cellular protection. The strong correlation between

the GST-π activities of plasma and esophageal tumor tissues has been reported[4].

Our result showed a significant increased ($p<0.001$) activity of GSTs in stage-III (received chemotherapy) than stage-II patients (TABLE 3). Many studies also showed progressive increase of GSTs with advancing cancer and has been associated with poor prognosis and development of drug resistance[8-10]. K.Johansson et al[11] reported GSTs protect the cells from lipid peroxidation and H2O2 which is increased by cisplastin, a chemotherapeutic drug. Our results show the association of serum GST and chemotherapy in esophagus cancer.

CONCLUSION

Serum GSTs measurement in plasma may be useful tumor marker in esophageal cancer and serum GSTs activity might be helpful to predict the response of chemotherapy in advance stages of cancer.

REFERENCES

[1] A.Gallo, Charel cha; Updates on esophageal and gastric cancer. Gastroenterol, **12(20)**, 3237-3242 **(2006)**.

[2] P.Ghadirian; Food habits and esophageal cancer: an overview. Cancer Detect Prev., **16**, 163-8 **(1992)**.

[3] B.F.Coles, F.F.Kadluber; Detoxification of electrophilic compounds by GST catalysis; determinants of individual response to chemical carcinogens and chemotherapeutic drugs? Biofactors, **17(1-4)**, 115-30 **(2003)**.

[4] G.S.Mohammadzadeh, S.N.Moghadam; Measurement of GST & its class-π in plasma & tissue biopsies obtained after laparoscopy & endoscopy from subjects with esophagus & gastric cancer. Clinical Biochemistry, **36**, 283-288 **(2003)**.

[5] S.A.Sheweita, A.K.Tilmisany; Cancer & phase-II drug-metabolizing enzymes. Curr.Drug Metab., **4(1)**, 45-58 **(2003)**.

[6] W.H.Habig, M.J.Pabst; Glutathione-S-transferases. The first enzymatic step in mercapturic acid formation. J.Biol.Chem., **249(22)**, 7130-9 **(1974)**.

[7] W.C.De Bruin, M.J.Wagenmans; Expression of GST alpha, P1-1 & T 1-1 in the human gastrointestinal tract. Jap.J.Cancer Res., **91**, 310-6 **(2009)**.

[8] W.H.Peters, T.Wobbes; GST in esophageal cancer. Carcinogenesis, **14**, 1377-80 **(1993)**.

[9] P.C.Hayes, I.D.H.Bouchier; GST in humans in health & diseases. Gut, **32**, 8138 **(1991)**.

[10] K.Johansson, K.Ahlen; Microsomal GST-1 in anticancer drug resistance. Carcinogenesis, **28(2)**, 465-470 **(2007)**.