VITAMIN C STATUS, GLUTATHIONE AND HISTAMINE IN GASTRIC CARCINOMA, TUBERCULOUS ENTERITIS AND NON-SPECIFIC ULCERATIVE COLITIS

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Summary : Studies were conducted to evaluate the blood levels of ascorbic acid, dehydroascorbic acid, glutathione, and histamine in patients with gastric carcinoma, tuberculous enteritis and non-specific ulcerative colitis. Leucocyte ascorbic acid, urinary excretion of total ascorbic acid and ascorbic acid saturation test were also carried out in order to assess the ascorbic acid status of these patients.

It was observed that the plasma and leucocyte content of ascorbic acid was significantly lower with markedly decreased urinary excretion in these patients. Further urinary excretion of ascorbic acid after a test dose was also found to be subnormal. Decreased levels of glutathione and significantly higher levels of histamine reflect an overall reducing status of the body is markedly deranged.

 Key words
 : ascorbic acid
 glutathione
 histamine
 gastric carcinoma

 tuberculous
 enteritis
 non-specific ulcerative colitis

INTRODUCTION

It has been reported that ascorbic acid, dehydroascorbic acid and glutathione values have considerable influence in regulating the overall reducing status of the body (1,6,12). Changes in the reducing status are associated with abno mal carbohydrate and protein metabolism as well as with derangement of the body resistance. Moreover, it is well known that the vascular histamine content markedly increases in patients of peptic ulcer and depresses the ascorbic acid content of adrenal glands (6). Glutathione and dehydroascorbic acid form a reversible oxidation and reduction system and glutathione can protect oxidation of ascorbic acid to dehydroascorbic acid (1). Work has been carried out on the ascorbic acid contents of leucocytes and plasma in patients with peptic ulcer (6), but very limited literature is available on the reducing contents of the body wih different

gastrointestinal diseases The present study has been undertaken to evaluate the overall reducing status of the body in patients with some gastrointestinal diseases.

MATERIAL AND METHODS

The study is based on 25 subjects with gastro-intestinal diseases comprising 5 cases of gastric carcinoma, 10 cases of tuberculous enteritis and 10 cases of non-specific ulcerative colitis with 10 age matched individuals as control. Cases were selected from the gestroenterology clinic and the clinical diagnosis was confirmed by barium meal X-ray studies, endoscopic examinations using fibre optic endoscope, haematological examination, sigmoidoscopy and biopsy.

Fasting blood was collected aseptically from antecubital vein, in a heparinised tube. The plasma was assayed for dehydrosacorbic acid and reduced ascorbic acid by 2 : 4 dinitrophenyl hydrazine method as described by Roe and Kuether (10). Assays were made within half an hour of the collection of the blood samples to prevent destruction of ascorbic acid. Leucocytes were separated by the method described by Gupta and Agrawal (7) and their ascorbic acid content was determined by 2,4 dinitrophenyl hydrazine method. Urine samples were collected and total ascorbic acid content was estimated by 2,6 dichlorophenol indophenol dye method as described by Varley (14). The patients were also subjected to ascorbic acid saturation test as described by Oser (9). Glutathione and histamine were estimated as described by Beutler *et al.* (2) and Clark *et al.* (4) respectively. Ten normal healthy individuals were selected and investigated for the above parameters to serve as controls.

RESULTS AND DISCUSSION

There was significant fall in the values of reduced ascorbic acid, leucocyte ascorbic acid, urinary excretion after test dose with a marked increase in the concentration of dehydroascorbic acid in all the groups of patients as compared to controls (Table I).

Table II indicates a significant decrease in the blood glutathione levels and markedly higher values of histamine in all the groups of patients as compared to the controls.

It is interesting to note (Table I) that all the patients suffering from gastrointestinal diseases included under the present study showed significantly decreased levels of leucocyte ascorbic acid. In addition, all of them showed low concentration of plasma ascorbic acid and inteased concentrations of dehydroascorbic acid The urinary excretion of ascorbic acid was also significantly decreased in these patients. The ascorbic acid saturation test indicated deficiency of ascorbic acid in these patients. These results together

Diagnosis		Plasma AA mg/100 ml	Plasma DHA mg/100 ml	Leucocy- AA µg/108	Urinary excretion mg/day	Urinary AA within@4 hrs of in- gestion of 200 mg AA
Control	(10)	0.86±0.1	0.09±0.01	21.94±3.48	23.45±5.62	30.7 ±3.20
Gastric Carcinoma	(05)	0.22±0.07*	0.58±0.05*	11.00±1.19*	3.82±0.28*	15.88±1.60*
Tuberculous enteritis	(10)	0.33±0.14*	0.36±0.05*	14.10±2.86*	7.62±2.50*	19.74±2.60*
Nonspecific uncerative colitis	(10)	0.30±0.13*	0.36±0.06*	13.23±5.48*	8.10±5.48*	16.10±2.37*

TABLE I: Ascornic acid status of the patients suffering from gastrointestional disorders (results are espressed in terms of mean values ±S.D.)

* P<0.001 ; Figures in parentheses indicate number of cases.

TABLE II : Blood levels of glutathione and histamine in gastrointestinal disorders (results are expressed in terms of mean values ± S.D.)

Diagnosis		Glutathione (reduced) mg/100 ml blood	Histamine µg/100 ml blood
Control	(10)	63.43±1.20	4.29 ±1.04
Gastric Carcinoma	(05)	40.50±1.50*	18.91 ± 2.46*
Tuberculous enteritis	(10)	48.07±3.07*	8.46±0.97*
Nonspecific ulcerative colitis	(10)	39.23±6.01*	21.86±2.58*

* P<0.001 : Figures in parantheses indicate number of cases

with the demonstration of increased plasma level of dehydroascorbic acid indicate that the patients are in poor state of ascorbic acid status, which was maximum in carcinoma of the stomach.

This is in accordance with the observations of Krasner and Dymock (8), who further stated that the ascorbic acid utilization in patients with malignant disease was markedly increased and emphasized the ascorbic acid supplement to these patients. The observation that dehydroascorbic acid was markedly increased in all groups indicate that the catabolism of ascorbic acid is markedly increased in these conditions (5). It is evident from values in Table II that in all the groups of gastrointestinal diseases, glutathione (GSH) values of bood were decreased. Since the glutathione (GSH) contents of these patients are lower, therefore, the protection of ascorbic acid from oxidation is subnormal as ascorbic acid and dehydroascorbic acid equilibrium is governed to a great extent by glutathione levels (13).

It is also evident from Table II that the blood levels of histamine were significantly higher in all these patients as compared to control values. However, this increase was more marked in the patients of ulcerative colitis and gastric carcinoma as compared to tubercular enteritis patients. Further it is observed that there is inverse relationship between 114 Dubey et al.

leucocytes ascorbic acid and histamine levels though no linear relationship exist between ascorbic acid and histamine in these group of patients.

From the above observations it can be safely concluded that the increased levels of histamine is always associated with the decreased levels of glutathione and with poor ascorbic acid status. It is known that histamine depresses the ascorbic acid content of the adrenal cortex. Schayer (11) reported that histamine production is considerably increased in response to biochemical stress Subramanian et al. (13) in their study concluded that one function of ascorbate was detoxification of excess of histamine produced in response to biochemical stress. It is difficult to conclude at this juncture that increase in histamine is due to biochemical stress or due to poor availability of ascorbic acid or vice-versa but one point is obvious that these patients are in poor state of tissue status of ascorbic acid.

A clinical trial to explore the beneficial effect of ascorbic acid in these groups of patients may be undertaken to find out the place of ascorbic acid as a therapeutic index.

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