

## Study of Glutathione and Total thiol Levels in Irritable Bowel Syndrome Patients

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### Abstract

**Background:** Irritable bowel syndrome (IBS) is a common gastrointestinal condition characterized by abdominal pain and cramps; changes in bowel movements (diarrhea, constipation, or both); gassiness; bloating; nausea; and other symptoms. There is no cure for IBS; however, dietary changes, stress management, and sometimes medications are often able to eliminate or substantially reduce its symptoms.

**Purpose:** It is well documented that disturbances of oxidant-antioxidant balance in psycho-somatic disease especially in irritable bowel syndrome.

**Materials and Methods:** Glutathione and total thiols were studied in twenty patients aged 18-35 years, compared with twenty sex and age matched healthy subjects.

**Results:** Serum glutathione and total thiol groups levels were significantly decreased in irritable bowel syndrome (IBS) than healthy controls.

**Keywords:** Irritable bowel syndrome (IBS), Glutathione GSH, Total thiols SH.

### Introduction:

Irritable Bowel Syndrome (IBS) or spastic colon, is a disorder of the gastrointestinal system. Symptoms include abdominal pain and discomfort, bloating and changes in bowel habits (defecation) without an organic or infectious cause. In some instances, diarrhea is common, and in other sufferers, constipation is more common, while others shift between the two problems. Irritable Bowel Syndrome can begin at any time, but it often starts soon after an infection or a new, major source of stress in the sufferer's life. No cause of Irritable Bowel Syndrome has been determined with certainty, but some theorize that abnormalities in the populations of bacteria in the gut may be responsible, while others point to the immune system or a disorder of the interactions between the brain and the gastrointestinal tract, known as the psycho-somatic theory. (Dalton, et al. 1997), (Lynn and Lawrence 2004) (Margaret ,2004), (Nancy et al. 2007).

Stress feeling mentally or emotionally tense, troubled, angry or overwhelmed stimulates colon spasms in patients with IBS since there is a close nervous system connection between the brain and the intestines. A large network of nerves control the normal rhythmic contractions of the colon. Although researchers do not yet understand all of the links between changes in the nervous system and IBS, they point

out the similarities between mild digestive upsets and IBS. Just as healthy people can feel nauseated or have an upset stomach when under stress, patients with IBS react the same way, but to a greater degree. (Hyams, et al. 1996), (Jarrett et al. 2003).

Some foods and beverages appear to play a key role in triggering IBS attacks. Certain foods and drinks may disrupt peristalsis in IBS patients, which may explain why IBS attacks often occur shortly after meals. (Van Vorous and Heather 2000).

Glutathione is a significant component of the collective antioxidants defenses, and a highly potent antioxidant and antitoxin in its own right. The SH group of GSH is important for many facets of cell function, and early suggestion that GSH plays multiple regulatory roles at the cell level are born out by the cumulative findings. The reduced glutathione is conventionally called glutathione(GSH); the oxidized form is a sulfur- sulfur linked compound known as disulfide(GSSG), and GSSG/ GSH ratio may be a sensitive indicator of oxidative stress.( Kehrner and Lund, 1994). The reduced glutathione molecule consists of three amino acids glutamic acid, cysteine and glycine covalently joined end to end. The sulfhydryl (SH) group, which gives the molecule its electron donating character, comes from the cysteine residue. Glutathione inside cells mainly in its reduced GSH form(electron rich antioxidant). In the healthy cell GSSG form(electron poor),rarely exceeds 10 % of total cell glutathione.( Duke , et al. 1996)

Total thiol are contain potential sulfhydryl group (SH) in their structure, these can range from the simply amino acid, cysteine, and protein contain them, thiols exist in two pools protein and non protein( Halliwell and Gutteridge , 1995)

### **Patients:**

Blood samples were collected from 20 patients, aged 18-35 years and 20 healthy subjects, aged 18-35 years as control group. After clotting, serum was separated by centrifugation at 3000 rpm, and stored at -20°C for used within 72 hours.

### **Methods:**

Glutathione is determined by a modified procedure utilizing Ellman's reagents, this methods principles as a reduced of 5,5-dithiobis(2- nitro benzoic acid by sulfhydryl group of GSH to yellow compound, the absorbance is measured at 412nm (Burtis 1999 and Ashwood ),(Ellman , 1959).

The total thiol groups were evaluated in 200 µL serum sample by colorimetric reaction with 5,5'- dithiobis(2-nitrobenzoic acid) as reported (Hu, 1994).

### **Statistical analysis.**

All results are expressed as a mean  $\pm$  SD(standard deviation), comparison between patients and controls were preformed by the student's t- test. Person's correlations were used to determine relationship between parameters studied. A value of  $p \leq 0.05$  was considered statistically significant

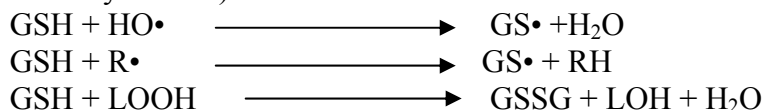
### **Results and Discussion:**

Serum glutathione GSH levels and total thiol groups levels were significantly decreased ( $P=0.00$ ),( $P=0.05$ ) respectively for IBS patients as compared with healthy controls group as shown in Table 1.

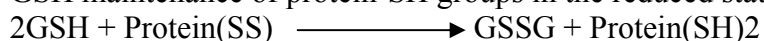
**Table 1. Total thiols( $\mu\text{mol/L}$ ) and GSH ( $\mu\text{M}$ ) levels in control and patients**

| Total thiols ( $\mu\text{mol/L}$ ) |              |             |             |               |              |              |
|------------------------------------|--------------|-------------|-------------|---------------|--------------|--------------|
|                                    | Mean         | SD          | SE          | Upper value   | Lower value  | P – value    |
| <b>Control</b>                     | <b>270.5</b> | <b>45.5</b> | <b>12.3</b> | <b>350.6</b>  | <b>190.7</b> | <b>-----</b> |
| <b>Patients</b>                    | <b>200.2</b> | <b>20.2</b> | <b>7.4</b>  | <b>268.43</b> | <b>130.5</b> | <b>0.05</b>  |
| GSH( $\mu\text{M}$ )               |              |             |             |               |              |              |
| <b>Control</b>                     | <b>20.4</b>  | <b>2.7</b>  | <b>1.6</b>  | <b>24.4</b>   | <b>17.5</b>  | <b>-----</b> |
| <b>Patient</b>                     | <b>16.3</b>  | <b>4.3</b>  | <b>2.1</b>  | <b>20.1</b>   | <b>12.7</b>  | <b>0.00</b>  |

GSH plays role in such diverse biological processes as protein synthesis, enzyme catalysis, intermediary metabolism and appears to be an indicator of the cell's overall health and its ability to resist toxic challenge. The results explain that the sulfhydryl groups in the protein and non protein is oxidized by the production of free radicals and another reactive oxygen species and lipid peroxides producing from oxidative stress of these patients, thus, the oxidize and reduced glutathione ratio is increased which is a sensitive indicator of oxidative stress.(Kehrer Jp., and Lund G. 1994),(Al-Mashhedy L.2005).



GSH maintenance of protein-SH groups in the reduced state:



Oxidative stress originating from outside the body is a feature of life in the world. The tens of thousands of confirmed toxic substances in our external environmental are invariably sources of free radicals or related oxidants, as well as for this substantial burden the many negative aspects of the modern, lifestyle and a picture emerges of the human organism burdened by chronic disease and threatened with a shorter lifespan than might otherwise be possible(Cross CE., et al. 1987), (Kidd P. 1985).

It has been noted that serum SH groups are susceptible to oxidative damage in patients suffering from IBS ,hence the estimation of thiol groups may serve as an indicator for the diagnosis of the IBS and their complication.

## Conclusion

Serum glutathione and total thiol groups levels were significantly decreased in irritable bowel syndrome(IBS) than healthy controls. Irritable Bowel Syndrome(IBS) or spastic colon, is a disorder of the gastrointestinal system.

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