

ANTIOXIDANT STATUS AND SERUM TOTAL PROTEIN LEVELS  
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## ABSTRACT

**Background and Objective:** The imbalance between reactive oxygen species production and antioxidant defense determines the degree of oxidative stress. Vitamin C and GSH are important antioxidants, protects the cells from toxins such as free radicals. A total serum protein test measures the total amount of protein in the blood. The objective of the present study was to analyze the oxidative stress in elderly women, by evaluating the antioxidant status (vitamin c and glutathione), total protein and albumin levels.

**Materials and Methods:** The study group includes, Group 1 and Group 2 with 50 institutionalized and 50 non- institutionalized women's belonging at the age group of 50-65 years respectively. 2ml of venous blood was collected for the analysis of the level of Vitamin C, Total protein, Albumin and Glutathione by standard methods. Data were analyzed for the statistical significance using one way ANOVA.  $p < 0.05$  was considered significant. **Result:** The level of Vitamin C, Total proteins and Glutathione were significantly declined ( $p=0.03$ ,  $p=0.01$  and  $p=0.006$ ) in institutionalized women's as compared to non-institutionalized women's. **Conclusion:** Antioxidant and Total proteins are considered to be important in the maintenance of health. Antioxidant and Total protein levels were showing general tendency to decrease during ageing.

**Key words:** Total antioxidant, Glutathione, Total protein, Free radicals.

## INTRODUCTION

An imbalance between free radical production and antioxidant capacity causes oxidative stress. It is well known that oxidative stress leads to the development of many diseases, such as Alzheimer, atherosclerosis and Coronary Artery Diseases. The antioxidant defense system includes mainly Vitamin C and GSH, which protects the cells from toxins such as free radicals. The presence of GSH is required to maintain the normal function of the immune system as well. A total serum protein test measures the total amount of protein in the blood. Albumin is the major protein within the blood. It is synthesized exclusively by the liver. It is secreted from the Golgi apparatus across the sinusoidal membrane of the hepatocytes. In humans, the rate of synthesis varies, depending on hormonal environment, nutritional status, age, and other local factors. In some inflammatory conditions the release of tumor necrosis factor inhibits albumin synthesis but induces the synthesis of proteins of the acute phase response. Albumin helps keep the blood from leaking out of blood vessels. Albumin may decrease in chronic liver disease, particularly other reasons such as lack of protein, for example mal nutrition.

Though the concentration of serum protein, Vitamin C and GSH was estimated in elders, the comparative study on serum protein, Vitamin C and GSH level in elderly women at different environment was not well documented. Therefore the present study was undertaken to compare the antioxidant status and total serum protein levels in elderly women. The oxidative stress theory of aging offers the best mechanistic elucidation of the aging phenomenon and other age-related diseases. The susceptibility of an individual depends on the antioxidant status of the body.

## MATERIALS AND METHODS

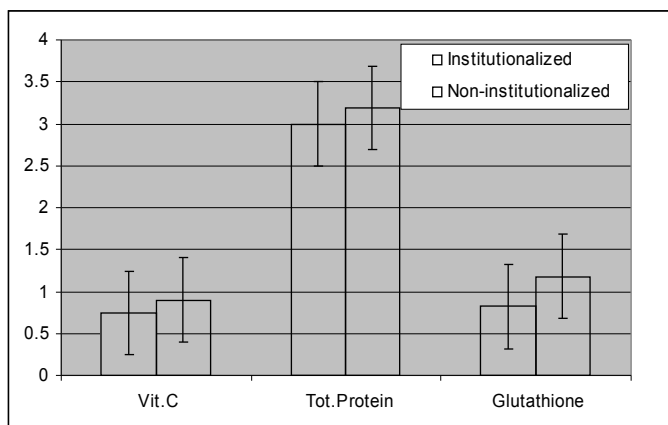
Elderly women reporting to central research laboratory of Nitte University were employed in the present study after an informed and written consent from all the subjects. To compare the antioxidant status, Vitamin C and total serum protein levels in elderly women, the institutionalized and non- institutionalized women's belonging to the age group of 50±10 years were selected. Subjects with congenital neurological or psychiatric pathologies, metabolic diseases, acute or chronic diseases were excluded in the present study. The study group includes Group-1 and Group-2 with 50 institutionalized and 50 non-institutionalized women's. 2 ml of venous blood was collected for the analysis of the level of Vitamin C, Total protein, Albumin and Glutathione by standard methods. The concentration of Vitamin C was assayed by DNPH method. The level of Total protein, albumin and Glutathione was determined by standard methods. Data were analyzed for the statistical significance using one way ANOVA, and were expressed as Mean±S.D, p<0.05 was considered significant.

## RESULTS

The level of Vitamin C was significantly declined (p=0.03) in institutionalized women's as compared to non- institutionalized women's (Table-1, Fig.1). The concentration of Total protein was also significantly declined (p=0.01) in institutionalized women's as compared to non- institutionalized women's (Table-1, Fig.1). The concentration of Glutathione was also found to be decreased significantly (p=0.006) in institutionalized women's as compared to non- institutionalized women's (Table-1, Fig.1).

**Table-1: The concentration of Vitamin-C, Total protein and Glutathione in institutionalized and non-institutionalized women's (Values are Mean ± S.D, n=50 each).**

PARAMETERS	Institutionalized Women	Non institutionalized Women	P VALUE
VITAMIN C (mg/dL)	0.74 ± 0.24	0.9 ± 0.29	0.03
TOTAL PROTEIN (g/dL)	3.00 ± 0.28	3.19 ± 0.26	0.01
GLUTATHIONE (nmol/mg)	0.82 ± 0.52	1.18 ± 0.34	0.006



**Fig-1: Comparison of the concentration of Vitamin-C, Total protein and Glutathione in institutionalized and non-institutionalized women's. The level of Vitamin C, Total protein and Glutathione was declined significantly in institutionalized women's as compared to non-institutionalized women's.  $p = 0.03$ ,  $0.01$  and  $0.006$  respectively for Vitamin C, Total protein and Glutathione.**

## DISCUSSION

Antioxidant and Total proteins were considered to be important in the maintenance of health.

Antioxidant level and Total proteins were showing general tendency to decrease during ageing (1). In our study, we found that the concentration of Vitamin-C and Total Protein was significantly declined in institutionalized women when compared non- institutionalized women's. Albumin is the major protein within the blood. It is synthesized exclusively by the liver. It is secreted from the Golgi apparatus across the sinusoidal membrane of the hepatocytes. In humans, the rate of synthesis varies, depending on hormonal environment, nutritional status, age, and other local factors (2). In some inflammatory conditions the release of tumor necrosis factor inhibits albumin synthesis but induces the synthesis of proteins of the acute phase response. Albumin helps keep the blood from leaking out of blood vessels. Albumin also helps carry some medicines and other substances through the blood and is important for tissue growth and healing. Albumin may decrease in chronic liver disease, particularly other reasons such as lack of protein, for example mal nutrition. The decline in total protein in institutionalized women might be due to the poor nutrition.

Vitamins are organic chemicals that a given living organism requires in trace quantities for good health, but which the organism cannot synthesize and therefore must obtain from the diet (3). A significant decline in the concentration of vitamin C can cause scurvy, which manifests itself in loose teeth, hemorrhages, bruising, and inability to fight off infection, mild anemia, and bleeding (4,5). The level of Glutathione was also significantly decreased in institutionalized women when compared non-institutionalized women (6, 7). Vitamin C or L-ascorbate is a water soluble vitamin and an essential nutrient. It works by helping to form and maintain collagen.

It also supports a variety of the body's structures and is essential to the formation of bones and teeth. It is a highly effective antioxidant; acting to lessen oxidative stress, a substrate for ascorbate peroxidase as well as an enzyme cofactor for the biosynthesis of many important biochemical's and a potent water-soluble antioxidant in humans. The normal serum ascorbate level is 0.4-1.5 mg/dL. Humans do not create their own vitamin C and they need to consume it through foods rich in the vitamin C. A deficiency in vitamin C can cause scurvy, which manifests itself in loose teeth, hemorrhages, bruising, and inability to fight off infection, mild anemia and bleeding. If not treated, scurvy proves fatal. Ascorbic acid is essential for the formation of collagen and intercellular cortex substance also useful in metabolism of tyrosine, absorption of iron and incorporation of plasma iron in ferritin. Vitamin C also appears to function as buffer against cell damage from free radicals thought to be important in a number of disease processes as a specific electron donor. Glutathione (GSH), a tripeptide containing an unusual peptide linkage between the amine group of cysteine and the carboxyl group of the glutamate side chain. Glutathione, an antioxidant, helps protect cells from reactive oxygen species such as free radicals and peroxides. Glutathione is also nucleophile at sulfur and attacks poisonous conjugate acceptors.

Glutathione, a major endogenous antioxidant produced by the cells, participating directly in the neutralization of free radicals and reactive oxygen compounds, as well as maintaining exogenous antioxidants such as vitamins C and E in their reduced (active) forms. Through direct conjugation, Glutathione detoxifies many xenobiotics (foreign compounds) and carcinogens, both organic and inorganic. It is essential for the immune system to exert its full potential, e.g. In modulating antigen presentation to lymphocytes, thereby influencing cytokine production and type of response (cellular or humoral) that develops, In enhancing proliferation of lymphocytes thereby increasing magnitude of response, In enhancing killing activity of cytotoxic T cells and NK cells, and also in regulating apoptosis, thereby maintaining control of the immune response. Glutathione plays a fundamental role in numerous metabolic and biochemical reactions such as DNA synthesis and repair, protein synthesis, prostaglandin synthesis, amino acid transport and enzyme activation. Thus, every system in the body can be affected by the state of the glutathione system, especially the immune system, the nervous system, the gastrointestinal system and the lungs.

## CONCLUSION

From this study, we conclude that, institutionalization of elderly women's might lead to changes in the hormonal environment which will be a possible cause for decline in the concentration of Vitamin C, Total protein and Glutathione.

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