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Lipid –peroxidation & Non-enzymatic antioxidant (Vitamin E & Vitamin C) serum levels in Anemic Rheumatoid arthritis patients

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Abstract: *Rheumatoid arthritis (RA) is a chronic multisystem disease with an unknown etiology affecting about 1% of the world's population. Anemia is a frequently occurring extra articular manifestation of RA, being mostly of the normochromic & normocytic type. The aim of our study to assess and affirm whether the increased oxidative stress in inflamed joints is reflected by lipid-peroxidation? Also to check the alteration in levels of non –enzymatic antioxidant (vitamin E & vitamin C) in RA with Anemia. 100 patients with RA and 100 healthy individual were included in this study. A level of malonaldehyde (MDA), a lipid –peroxidation marker was measured by Utley's method. Non enzymatic antioxidant vitamin E and vitamin C was assayed in plasma/ serum by Shami Hashim & Carl A Burtis method. The levels of MDA were significantly increased (P<0.001) in RA as compared to control. Whereas levels of non-enzymatic antioxidant (Vitamin E & Vitamin C) were decreased in patients as compared to control. It is statistically significant (P<0.001). There was a raised oxidative stress and decreased non-enzymatic antioxidant (Vitamin E & Vitamin C) in anemic rheumatoid arthritis patients. These changes are probably due to efforts for reducing lipid-peroxidation and hence to lower tissue damage.*
Key Words*: Arthritis; lipid-peroxidation; anemia; oxidative stress; rheumatoid arthritis*

I. Introduction:

Rheumatoid arthritis (RA) is a progressive, relapsing and chronic inflammatory disease. Although it affects about 1% of the adult population, its etiopathogenesis has not been fully revealed yet [1]. Anemia is a frequent comorbity in patients with RA [2].Long-term outcome of this disease is characterized by significant morbidities, loss of functional capacity and increased mortality[3]. Oxidative stress can play an important role in the pathogenesis of RA. Acute & chronic oxidant stress to the vascular endothelium is a serious causative factor of vascular endothelium dysfunction and play an important role in the pathophysiology of some diseases, including diabetes[4], panic disorder[5],& inflammatory bowel diseases[6]. In recent years, increasing attention has been given to the role of reactive oxygen metabolites in the pathogenesis of inflammatory disease such as RA. Increased activity of free radicals, the unstable molecules associated with cell damage, is theorized to underline the mucosal injury commonly [7, 8]. Seen in various inflammatory diseases[9]. Lipid –peroxidation mediated by free radical is considered to be the major mechanism of cell membrane destruction and cell damage. Free radicals are formed in both physiological conditions in mammalian tissues[10]. The uncontrolled production of free radical is considered as an important factor in the tissue damage induced by several pathophysiologies. Alteration in the oxidant-antioxidant profile known to occur in rheumatic diseases[11]. Evidence suggested that RA has characteristics of free radical produced disease[12]. Malonaldehyde (MDA) is a major reactive aldehyde used as indicators of free radical induced tissue damage [13] & is found to be in RA patients[14]. It has been suggested by several researchers that enzymatic and non enzymatic antioxidant system are impaired in RA, & that RA patients are more prone to lipid peroxidation because of the reduced antioxidant system[15]. Vitamin E is the major chain breaking antioxidant in the body. It is considered the first line of defense against lipid-per oxidation as it protects cell membrane against attack by free radicals through its free radical scavenging activity[16]. In this study, lipid-peroxidation (MDA) and plasma/ serum non-enzymatic antioxidant (Vitamin E & Vitamin C) status of patients with RA investigated and compared with that of age and sex matched healthy controls.

II. Method:

This study was performed in 100 RA patients, age group between 30-70 years. An actual number of age and sex matched healthy subjects with similar socioeconomic status also investigated. All patients were diagnosed as having RA according to the American Rheumatism Association criteria of 1987[17] in the Department of Biochemistry, M.L.N. Medical College Allahabad. For the biochemical parameters to be analyzed, blood samples were collected after an overnight fast from the anticubital vein avoiding venostalsis in all subjects. EDTA vials were used for the estimation of non-enzymatic antioxidant (Vitamin E & Vitamin C) by Emer-Engle method[18]&Carl A Burtis[19] method .Lipid-peroxidation was determined by Utley's method [20]with the help of red cell hemolysate.

Statistical Analysis: The data are expressed mean ± SD. Statistical comparisons were performed by student t test. The null hypothesis was rejected by P< 0.05.

III. Result:

The levels of MDA was significantly higher in RA patients than in control subjects (P<0.001). While non- enzymatic antioxidant (Vitamin E & Vitamin C) were significantly lower in RA patients than in control subjects (P<0.001).

IV. Discussion:

Rheumatoid arthritis is a chronic relapsing immuno inflammatory multisystem disease with prominent synovial prolifaration and destruction of the articular cartilage and bone[21].The etiopathogenesis of RA remains obscure despite extensive research. The pathogenesis of RA is multifactorial and recent research has implicated oxygen free radicals as mediators of tissue damage[22]. Over production of reactive oxygen species leads to lipid-peroxidation and destroys the antioxidant defense system[23]. Based on this hypothesis several studies have been focused on oxidative stress in RA[9, 10-15]. Lipid –peroxidation can start by the attacks of free radicals on lipid. After a series of propagation reactions and hydro peroxide formation, these active substances decompose various end products, like MDA. It has been supposed that blood samples from patients with RA are more prone to lipid-peroxidation owing to compared antioxidant system [15]. In our study, MDA levels were found to be significantly elevated in the patients with RA compared to control (table 1). This is an agreement with other studies in which higher MDA levels have been reported in patients with RA [9, 24-25]. In contrast of our study, Kajanachumpol et a [26] reported no significant changes in MDA levels in rheumatoid arthritis as compared to control. We observed a significant decrease in the levels of plasma Vitamin E & Vitamin C (non-enzymatic defense system) in patients with rheumatoid arthritis as compared to control. The decrease in the levels on non-enzymatic antioxidant may be due to the increase turn over, for preventing oxidative damage in RA[27]. Vitamin E & Vitamin C, well known antioxidants, play an important role in the protecting the lipid of lipoproteins and other biomembranes against peroxidative damage by intercepting oxidants before they can attack the tissue[26]. Hence the decrease in plasma non-enzymatic antioxidants can be correlated to impairment in the antioxidant defense mechanisms, due to excess utilization by the inflamed tissues to scavenge the excessive lipid peroxides that are generated at inflammatory sites, or to scavenge accumulated lipid peroxides in plasma[28].

V. Conclusion:

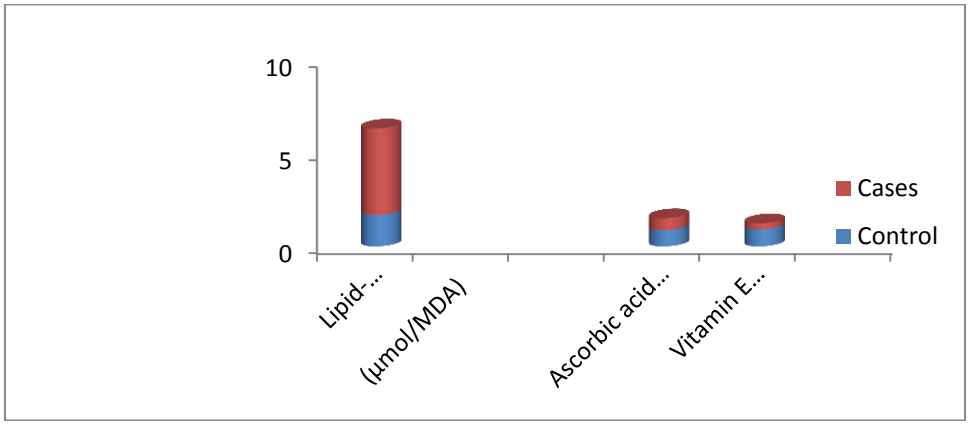
in conclusion, increased oxidative stress in patients with RA probably depends on their inflammatory response. These results indicate that oxidative stress and lipid-peroxidation were accelerated in patients with RA. Impaired antioxidant defense & increase lipid peroxidation suggest that treatment with antioxidants at the initial stages of illness may prevent further oxidative injury and deterioration of associated musculo skeletal deficts in RA.

Observation Table:

Table 1: Lipid-peroxidation and non-enzymatic antioxidant status in rheumatoid arthritis and control groups

S.N.	Particulars	Control (n=100)	RA patients (n=100)
1	Lipid-peroxidation	1.686±0.997	4.64±0.22
2	Vitamin E	0.907±0.25	0.33±0.02
3	Vitamin C	0.87±0.25	0.64±0.06

Figuer1: Lipid-peroxidation and non-enzymatic antioxidant status in rheumatoid arthritis and control groups



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