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OXİDANTS AND ANTI-OXIDANT STATUS IN PATIENTS WITH RHEUMATOID ARTHRITIS

Orthopaedics

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ABSTRACT

Numerous scientifi c investigations confi rmed the occurrence of oxidative stress in rheumatoid arthritis patients. There is evidence demonstrating elevated levels of oxidative stress markers and oxidative damage caused by reactive oxygen species (ROS) to lipids, proteins, sugars, and DNA, as well as a signifi cant decrease in total antioxidant capacity, which protects the organism against ROS activity. Extensive ROS production can signifi cantly accelerate the process of articular cartilage damage.

Rheumatoid arthritis (RA) is a chronic progressive inflammatory autoimmune disorder characterized by symmetric erosive synovitis and sometimes with multi-system involvement. But the exact mechanism of the disease is not fully understood. In the light of above explanation, the present study measured the plasma levels of Total Antioxidant capacity (TAC), and malondialdehyde (MDA) levels were measured to establish plasma oxidant/antioxidant status in the patient and control groups. Fasting blood samples were obtained from 30 patients with RA and 30 control subjects.The study raise the concept that oxidative stress as evidenced by increased MDA, and decreased TAC may play a key role in the pathogenesis of RA. The study also indicated a strong relationship between oxidative stress and rheumatoid arthritis .

KEYWORDS

Reactive oxygen species, Rheumatoid arthritis, Oxidative stress,Total Antioxidant capacity

INTRODUCTİON:

Oxygen metabolism has an important role in the pathogenesis of rheumatoid arthritis. Reactive oxygen species (ROS) produced in the course of cellular oxidative phosphorylation, and by activated phagocytic cells during oxidative bursts, exceed the physiological buffering capacity and result in oxidative stress. The excessive production of ROS can damage protein, lipids, nucleic acids, and matrix components. They also serve as important intracellular signaling molecules that amplify the synovial inflammatory–proliferative response (1)

Increased lipid peroxidation and decreased enzymic and non-enzymic antioxidants in RA.oxidant stress plays a very important role in the pathogenesis of RA (2). There was an increased oxidative stress and a low antioxidant status in patients with RA. These changes are probably due to efforts for reducing lipid peroxidation and hence to lower tissue damage(3). This oxidative stress may contribute to the cyclic self-perpetuating nature of rheumatoid inflammation [4]. there could be an important role of oxygen radicals, especially, when considering possible alterations in matrix and enzymes that degrade the matrix. In vitro studies demonstrated that enzymatically generated superoxide radicals produce hypochlorite ions. It has been focussed that this hypochlorite can depolymerise purified hyaluronic acid and damage protease inhibitors, resulting in uncontrolled activity of proteases [1,5,6].

This study aims to elucidate plasma oxidant/antioxidant status in patients with rheumatoid arthritis (RA). Patients of the present study were from the outpatients attending Rheumatology clinic of a tertiary care teaching hospital. Fasting blood samples were obtained from 30 patients with RA and 30 control subjects. Total Antioxidant capacity (TAC), and malondialdehyde (MDA) levels were measured to establish plasma oxidant/antioxidant status in the patient and control groups. This study is to evaluate whether oxidative stress has a role in the pathogenesis of RA.

Statistical analysis:

Results were expressed as mean and standard deviation (SD). Comparison between two variables were done using Student's t test..

RESULTS:

Table.1: Patients with RA had lower AOP and NSSA but higher MDA levels than those of the control subjects

Parameters	Control (n=30)	RA patients (n=30)	p Value
MDA nmol/dL	126.6 ± 3.20	146.67 ± 7.75	p<0.001
G6PD U/gm of Hb	12.1 ± 2.09	25.8 ± 2.18	p<0.001
Total Antioxidant Capacity (µmole/l)	1.32 ± 0.14	0.42 ± 0.09	p<0.001

Stastical Analysis:

Statisticaly significant increase in MDA levels in patient group and Decreased levels were found when compared with control group($p<0.05$)

DİSCUSSİON:

There is remarkable elevation of MDA levels in patients with RA compared to control. A similar study was conducted by the Departments of Medicine and Biochemistry at All India Institute of Medical Sciences, New Delhi, where the compared the levels of MDA in RA with healthy controls and patients with Osteoarthritis (OA). Their study showed that serum MDA levels in RA were significantly higher than healthy controls .[7] Similar observations are also noted in many other published studies [8-11].

G6PD activities of RA cases in RBCs were elevated compared to controls ($p < 0.001$). This could be due to disinhibition of G6PD, a regulatory enzyme of HMP pathway. In this, coenzyme NADPH generated mainly by G6PD of HMP shunt pathway is consumed and its oxidised form, NADP is released. This causes disinhibition of G6PD, the regulatory enzyme of HMP shunt pathway. This is reflected as raised activity of G6PD in the study. The antioxidant defense system is compromised in rheumatoid arthritis patients. There is a shift in the oxidant/antioxidant balance in favor of lipid peroxidation, which could lead to the tissue damage observed in the disease. Oxygen free radicals have been implicated as mediators of tissue damage in rheumatoid arthritis (RA).

Therapeutic coadministration of antioxidants along with conventional drugs to such patients has been considered beneficial. MDA is a product of lipid peroxidation and thereby functions as a marker of oxidative stress. The level of MDA in plasma or serum has been reported to be higher in RA patients than in control subjects and it is an indication of oxidative stress in these patients and Patients with RA had lower levels of TAC were found when compared with controls which is an indication of reduced antioxidant capacity in these patients and these two parameters will give a more comprehensive evaluation into oxidant/antioxidant status. It could be seen as an indication of reduced antioxidant capacity and oxidant stress in RA patients.Suggest that the antioxidant system is impaired and peroxidation reactions are accelerated in patients with RA.

CONCLUSİON:

As expected RA patients had higher levels of MDA and lower levels of TAC than healthy controls. Indicating that the antioxidant system is impaired and peroxidation reactions are accelerated in patients with RA. Overproduction of free radicals by inflammatory processes in RA

causes oxidative injury and damage antioxidant defence system in RA patients. The elevated lipid peroxidation in plasma in the present study, indicated by elevated MDA can be related to a compensatory defence system in RA.

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