

Status of Total Antioxidant Capacity in Pre & Post-Menopausal Women with RA

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Abstract: Introduction: Oxidative stress is a fundamental part of the aging process and outcome of the overproduction of free radicals such as reactive oxygen species (ROS). Usually ROS are neutralized by the antioxidants. Antioxidant levels decreases and brings about the degradation of joint cartilage in patients suffering from Rheumatoid arthritis. A high degree of oxidative stress has been observed in post-menopausal women as well. Aim: To evaluate the status of total Antioxidant capacity in pre and post-menopausal women with and without RA. Material and method: Present study was carried out in MGM Medical College, Indore during March 2023 - October 2023. Total 110 study subjects were taken out of which 35 were control A (Pre-menopausal women) and 35 were control B (Post-menopausal women) & 16 were Case Group A (Pre-menopausal women with RA) and 24 were Case Group B (Post-menopausal women with RA). Blood samples were collected from subjects and analyzed for TAC with kit based method. Inclusion criteria: Medically healthy pre-menopausal women of 20-45 years of age and post-menopausal women of 50-80 years of age and pre-menopausal women with RA of 20-45 years of age and post-menopausal women with RA of 50-80 years of age. Exclusion criteria: RA patients with diabetes, CHD and other major complications. Results: Results reveal that; 1) There are significant decreased levels of TAC has been observed in pre-menopausal and post-menopausal women with RA in comparison to healthy control. 2) There are significant decreased levels of TAC has been observed in post-menopausal women with RA in comparison to pre-menopausal women with RA Conclusion: A remarkable and significant change in the levels of TAC has been observed indicating that post-menopausal women tends to have more oxidative stress as compared to pre-menopausal women in both control as well as case group

Keywords: TAC, RA

1. Introduction

Rheumatoid arthritis (RA), an autoimmune disorder which mainly affects joints and is defined by synovitis causing cartilage and bone damage and systemic complications including disorders like cardiovascular, psychological, and other skeletal disorders [1]. The prevalence of RA is 1% of the worldwide population and women are more affected as compared to men. Although the disease onset is more frequent during the later stages of life. RA can occur at any age of the life [2].

Menopause which is basically reproductive aging is actually explained as the termination of ovarian follicular activity and ultimately the menstrual cycle [3,4]. Hormones like progesterone and estrogen are also fundamental to reproductive aging are not produced during menopause [5-7]. Eventually the decrease and ultimately the termination of estrogen production has been displayed symptoms during menopause which impact on each woman differently.

Oxidative stress is a fundamental part of the aging process and outcome of the overproduction of free radicals such as reactive oxygen species (ROS), which overcome the antioxidant defense mechanisms of the body. Usually ROS are neutralized by the antioxidants and helps to overcome the oxidative stress [8,9]. During RA also, antioxidant levels decreases and brings about the degradation of joint cartilage, attacking its proteoglycan and stopping its synthesis [10].

The aim of this study is to evaluate the status of total Antioxidant capacity in pre and post-menopausal women with and without RA. The study was carried out with following objectives:

- 1) The status of total Antioxidant capacity in medically healthy pre-menopausal women and pre-menopausal women with RA.
- 2) The status of total Antioxidant capacity in medically healthy post-menopausal women and post-menopausal women with RA.
- 3) The status of total Antioxidant capacity in pre and post-menopausal women with RA.

2. Material and methods

The present study was conducted from March 2023-October 2023 at MGM Medical College, Indore, MP and Government Holkar Science College, Indore, MP.

Total 110 study subjects were taken out of which 35 were control A (Pre-menopausal women) and 35 were control B (Post-menopausal women) & 16 were Case Group A (Pre-menopausal women with RA) and 24 were Case Group B (Post-menopausal women with RA).

Blood samples were collected from subjects and analyzed for TAC with kit based method.

Inclusion criteria for cases:

- 1) Female patients who were diagnosed with RA according to 2010 American college of Rheumatology (ACR)⁽¹¹⁾
- 2) Medically healthy pre-menopausal women of 20-45 years of age and post-menopausal women of 50-80 years of age.
- 3) Pre-menopausal women with RA of 20-45 years of age and post-menopausal women with RA of 50-80 years of age.

Exclusion criteria for cases:

RA patients with diabetes, CHD and other major complications.

- The serum levels of TAC were taken in pre and post-menopausal control women and pre and post-menopausal women with RA.

Statistical analysis:

- Statistical analysis was conducted using SPSS. Data were represented as Mean ± SD. Comparison were analysed by student t test and p value.

3. Observation and Result

Table 1: Comparative study of Serum levels of TAC in Control Group A (Pre-menopausal women) and Case Group A (Pre-menopausal women with RA)

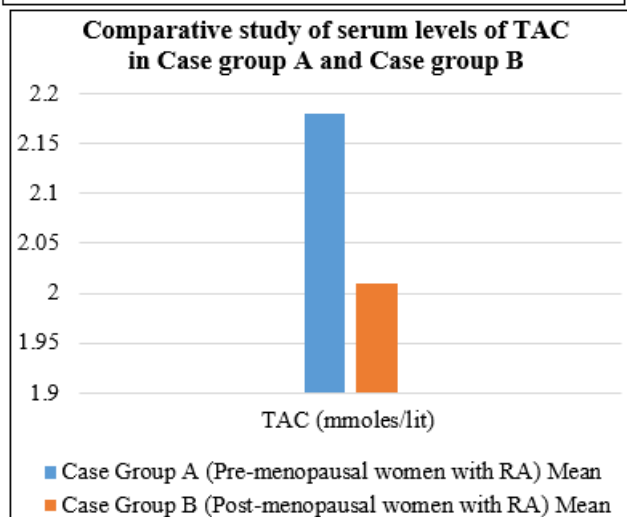
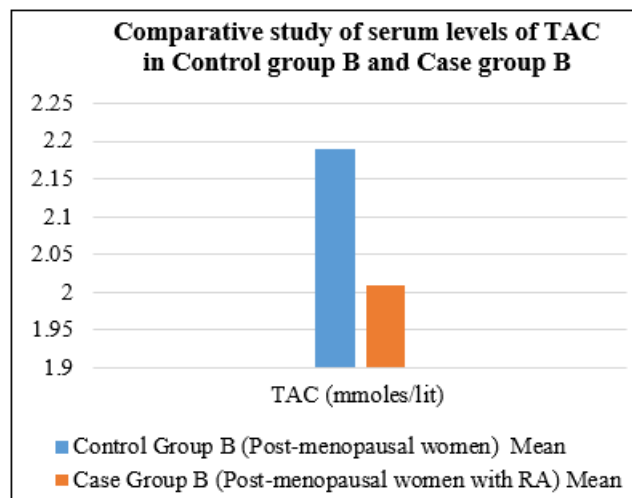
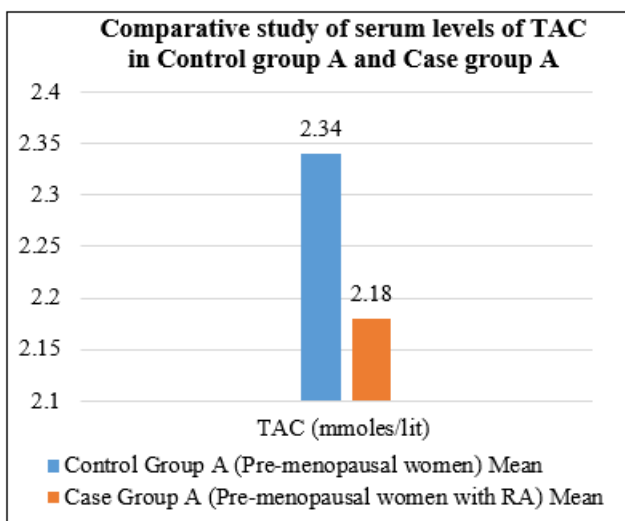
S.N.	Parameter	Control Group A (Pre-menopausal women) Mean & ± SD (n = 35)	Case Group A (Pre-menopausal women with RA) Mean & ± SD (n = 16)	p value
1.	TAC (mmoles/lit)	2.34 ± 0.19	2.18 ± 0.15	< 0.001

Table 2: Comparative study of Serum levels of TAC in Control Group B (Post-menopausal women) and Case Group B (Post-menopausal women with RA)

S.N.	Parameter	Control Group B (Post-menopausal women) Mean & ± SD (n = 35)	Case Group B (Post-menopausal women with RA) Mean & ± SD (n = 24)	p value
1.	TAC (mmoles/lit)	2.19 ± 0.17	2.01 ± 0.19	< 0.001

Table 3: Comparative study of Serum levels of TAC in Case Group A (Pre-menopausal women with RA) and Case Group B (Post-menopausal women with RA)

S.N.	Parameter	Case Group A (Pre-menopausal women with RA) Mean & ± SD (n = 16)	Case Group B (Post-menopausal women with RA) Mean & ± SD (n = 24)	p value
1.	TAC (mmoles/lit)	2.18 ± 0.15	2.01 ± 0.19	< 0.001



Results reveal that;

- There are significant decreased levels of TAC has been observed in pre-menopausal women with RA in comparison to healthy control.
- There are significant decreased levels of TAC has been observed in post-menopausal women with RA in comparison to healthy control.
- There are significant decreased levels of TAC has been observed in post-menopausal women of control group in comparison to pre-menopausal women of control group.
- There are significant decreased levels of TAC has been observed in post-menopausal women with RA in comparison to pre-menopausal women with RA

4. Discussion

Oxidative stress plays a pivotal role in aggravation of symptoms in RA as well as in post-menopausal women. Assessments in control and case group demonstrated that in addition to elevated ROS and lipid peroxidation formation there is a decrease in antioxidant defenses^[12, 13, 14, 15] which in turn lowering down the serum levels of total antioxidant capacity.

RA is one of the conditions where oxidative stress is induced.

There is an increase in production of ROS (Reactive oxygen species) in RA patients. ROS are required to maintain the cell redox state and play an important role in cell signalling, differentiation, proliferation, growth, apoptosis, cytoskeletal regulation, and phagocytosis under normal physiological conditions. If the ROS are increased beyond physiological conditions they can bring about the damage of cellular components, such as proteins, nucleic acid and lipids in the cell membranes. Antioxidants counteract the damaging effect of ROS. Oxidative stress is correlated with inflammation and elevated joint destruction in RA patients^[16,17,18].

In the body of the post-menopausal women because of the significant reduction in levels of estrogen there is an increase levels of oxidative stress. Estrogen seems to have the valuable antioxidant effect by inhibiting the 8-hydroxylation of guanine DNA bases, at high concentrations while at low concentration it breaks the genetic material, forms the DNA adducts and brings about oxidation of bases behaving like a pro-oxidant^[19]. Apart from this, it has been found that serum levels of inflammatory cytokines and pro-oxidant biomarkers such as glutathione, 4-hydroxynenal, and malonaldehyde were lower in pre-menopausal women as compared to postmenopausal women^[20]. A high degree of oxidative stress has been reported in post-menopausal stage because of the increase in the cytokines and pro-oxidant makers^[20,21].

The decrease in total antioxidant capacity in combination with gradual decline of estrogen in the women demonstrate consequences of menopause such as heart disease, vasomotor disturbances, and osteoporosis^[22,23].

Limitation of study:

- There was a small number of patients included.
- Duration of the disease in patients were not taken into consideration.

5. Conclusion

A remarkable and significant change in the levels of TAC has been observed indicating that post-menopausal women tends to have more oxidative stress as compared to pre-menopausal women in both control as well as case group. Also, post-menopausal women with RA and pre-menopausal women with RA tends to have more oxidative stress as compared to Control group.

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