

# Association Between Malonaldehyde and Antioxidant Status in Menopausal Women in a Tertiary Care Teaching Hospital

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## ABSTRACT

**Background:** In the menopausal women, the oxidative stress is due to decrease in the estrogen level in the body, which in turn decrease the antioxidant status of the body, leading to various complications i.e., osteoporosis, cardiovascular disease etc. Due to osteoporosis, there is maximum chance of bone fracture & falls.

**Aims:** To find out the association between Malondialdehyde and Antioxidant status in Menopausal women in a tertiary care teaching hospital.

**Methods & Material:** This is Cross sectional type of study, which was conducted in the department of Biochemistry in collaboration with Department of Obstetrics & Gynaecology at Major S. D. Singh medical College & Hospital, Farrukhabad, UP, India during the period of July 2017 to August 2019. For the analysis total 310 subjects had been enrolled with the age between 30 to 60 years.

**Results:** It has been observed the larger changes in the level of Malondialdehyde & antioxidant status of Menopausal women. The Oxidative stress marker (MDA) level was significantly lower in Premenopausal women than that of Postmenopausal women. But Antioxidant status level was found to be significantly higher in Premenopausal women than that of Postmenopausal women.

**Conclusion:** Increased Malondialdehyde level & decreased Antioxidant status, which leads to development of oxidative stress and it has been directly linked with the development of osteoporosis & increased chances towards development of complication related to CVS. As a step for the prevention of various complication, early detection of oxidative stress marker level i.e., MDA level and antioxidant status can be done and can be treated accordingly.

**Keywords:** Malondialdehyde, Osteoporosis, Antioxidant.


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## Article History:

**Received:** 13-04-2021, **Revised:** 09-05-2021, **Accepted:** 30-05-2021

## Access this article online

Website: <a href="http://www.ijmrp.com">www.ijmrp.com</a>	Quick Response code 
DOI: 10.21276/ijmrp.2021.7.3.007	

## INTRODUCTION

Menopause is the time of women life when there is adaptation of physical, emotional, mental and hormonal changes associated with the cessation of menstrual period.<sup>1</sup> Menopause occurs between the age of 45 – 50 years. Around 60 million Indian women are above the age of 55 years and the majority of 1/3<sup>rd</sup> is spending their life at stage of postmenopause.<sup>2</sup> Oxidative stress plays an integral role in the aging process and results from the overproduction of free radicals such as reactive oxygen species, which overwhelm the body's antioxidant defence mechanisms.<sup>3,4</sup> The marked reduction in the estrogen has been shown to increase levels of oxidative stress in the body, depending on the concentration and chemical structure of this hormone.<sup>5</sup>

In healthy, premenopausal women there is usually an appropriate balance between free radicals & antioxidant mechanisms.<sup>3,6</sup> Our aim was to find out the association between Malondialdehyde and Antioxidant status in Menopausal women in a tertiary care teaching hospital.

## MATERIALS & METHODS

**Study Design:** Cross Sectional Study

**Study Setting:** Department of Biochemistry in collaboration with Department of Obstetrics & Gynaecology at Major S. D. Singh Medical College & Hospital, Farrukhabad, UP, India during the period of July 2017 to August 2019.

**Sample Size:** Total of 310 women were enrolled in the study of Major S.D. Singh Medical College & Hospital, Farrukhabad, UP. These were divided into two groups-

**Cases:** 155 Post-menopausal women (46- 60 years)

**Controls:** 155 Pre-menopausal women (30-45 years)

**Sample Size Calculation**

$$\text{Number of sample size (n)} = \frac{Z^2 Pq}{e^2}$$

Where,

n: - Number of Sample Size

Z: - Standard error (2 for 95% of error)

P: - Prevalence (0.27%)

q: - 1-P = 1-0.27=0.73

e: - Allowance error (20% of prevalence)

**Source of Data:** All women attending OPD in the Department of Obstetrics & Gynaecology at Major S. D. Singh Medical College & Hospital, Farrukhabad, UP, India and fulfilling the defined criteria were included in the study till the desired sample size is reached.

**Inclusion Criteria**

- **Control Group:** Premenopausal healthy women in the reproductive age group (n=155), normally menstruating women with age between 30 – 45 years.
- **Study Group:** Post-menopausal healthy women (n=155), women with one year of amenorrhea and were not receiving any hormonal replacement therapy, age group between 46 – 60 years.

**Exclusion Criteria:** The women with any bone fracture in previous 1 year, with known hepatic or renal diseases, with known malabsorption syndromes or gastric banding surgeries, suffering from diabetes, hypertension. On any medication like anticonvulsants, thiazide diuretics, steroids, bisphosphonates, estrogen or progesterone. Women taking vitamin D and calcium supplements last for 6 months. Women taking oral contraceptives, smoker, alcoholic, supplementation with nutritional antioxidants, and any bone diseases were excluded from this study.

**Sample Collection & Biochemical Analysis:** After obtaining proper informed written consent, 10ml of blood sample was drawn using disposable syringe under aseptic conditions into a sterile vacutainer from selected subjects with label. Collected blood sample was allowed standing at room temperature for 3 minutes for clotting. Then serum was separated by centrifugation at 3000 rpm for 5 minutes.

1. Estimation of Serum Malondialdehyde by Thiobarbituric Acid Reactive Substances (TBARS) method
2. Estimation of Antioxidant Status by Ferric reducing antioxidant Power (FRAP)

**Statistical Analysis:** The data obtained were analysed & all the parameters were given as mean ± standard deviation (S.D.). The comparisons between two groups, Pre-menopausal women (Control) & Post-menopausal women (Case) were analysed by Student's t-test. Correlations between variables were analyzed by Pearson's correlation coefficient test P< 0.05 and P< 0.01 was considered significant.

**Ethical Clearance:** The Institutional Ethics Committee of Major S. D. Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India has approved the Research work proposed to be carried out at Major S. D. Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India dated 12 June 2017 with Reference no SU/2017/683 (4)

**Table 1: Oxidative stress marker (MDA) & Antioxidant status level of Premenopausal women & Postmenopausal women.**

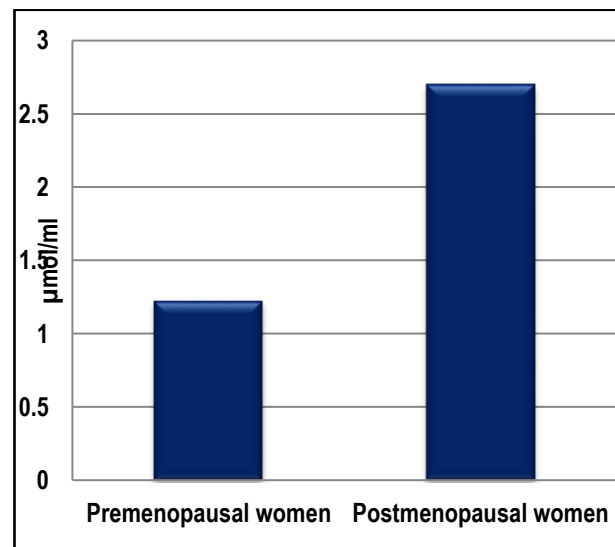
Parameter	Pre-menopausal women	Post-menopausal women	p Value
MDA (µmol/ml)	1.23±0.41	2.7±0.34	< 0.0001
Antioxidant Status (µmol/L)	1.55±0.12	0.9±0.20	< 0.0001

**Table 2: Correlation of Oxidative stress marker (MDA) with Antioxidant Status in Postmenopausal women.**

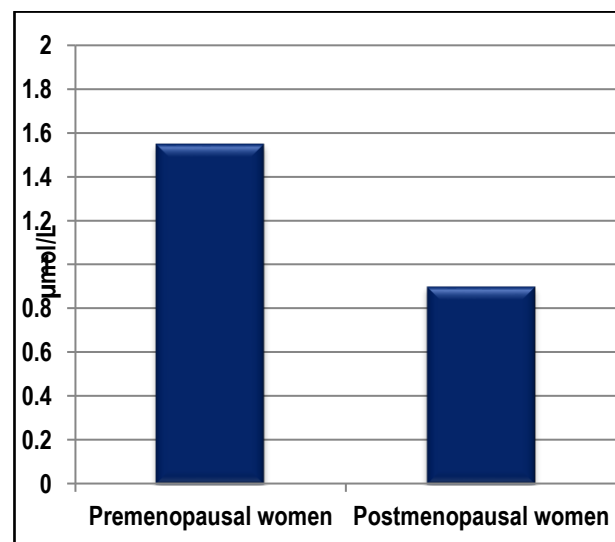
Parameter	MDA	
	r- Value	p Value
Antioxidant Status (µmol/L)	- 0.90	<0.0001

**Table 3: Correlation of Oxidative stress marker (MDA) with Antioxidant Status in premenopausal women.**

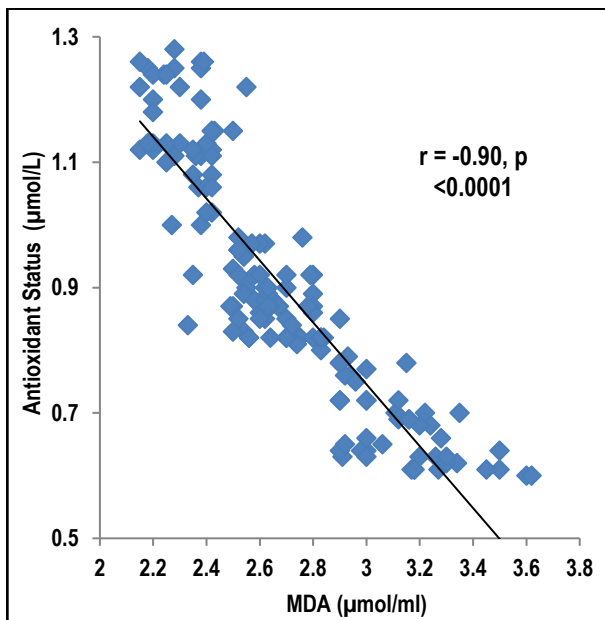
Parameter	MDA	
	r- Value	p Value
Antioxidant Status (µmol/L)	- 0.92	<0.0001



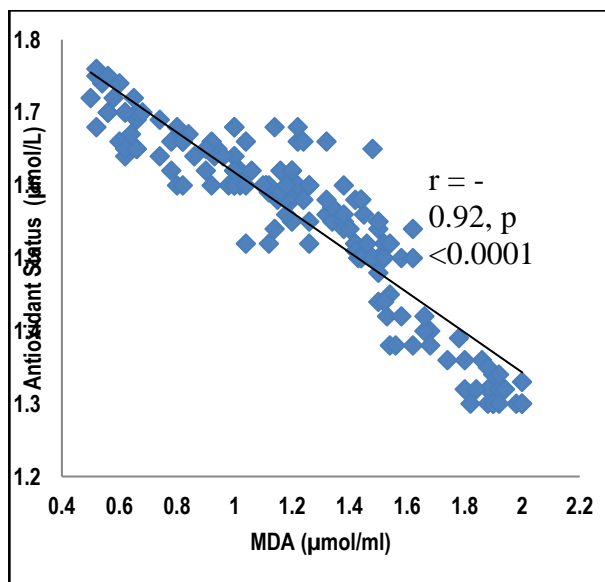
**Figure 1: Oxidative stress marker (MDA) level in Premenopausal women & Postmenopausal women.**



**Figure 2: Antioxidant status in Premenopausal women & Postmenopausal women.**



**Figure 3: Correlation of Oxidative stress marker (MDA) with Antioxidant Status in Postmenopausal women.**  
(*r* Value represents the Pearson's Coefficient,  $p < 0.05$  considered as significant)



**Figure 4: Correlation of Malondialdehyde with Antioxidant Status in premenopausal women**  
(*r* Value represents the Pearson's Coefficient,  $p < 0.05$  considered as significant)

## RESULTS

In the present study 310 subjects were studied of which 155 healthy Pre-menopausal women as control & 155 Post - Menopausal Women as cases.

The Serum Malondialdehyde & Antioxidant status were evaluated. The mean & Standard deviation of all variables were registered.

Table 1 & Figure 1& 2 were dealing with the Oxidative stress & Antioxidant status level in Premenopausal women & Postmenopausal women. The Oxidative stress marker (MDA) level was significantly lower in Premenopausal women than that of Postmenopausal women. But Antioxidant status level was found to be significantly higher in Premenopausal women than that of Postmenopausal women.

Table 2 and Figure 3 were showing the correlation of Oxidative stress marker (MDA) with Antioxidant status in Postmenopausal women. There was negative association between MDA and Antioxidant Status ( $r = -0.90$ ;  $p < 0.0001$ )

Table 3 and Figure 4 were showing the correlation of Oxidative stress marker (MDA) with Antioxidant Status in premenopausal women. There was negative association between MDA and Antioxidant Status ( $r = -0.92$ ;  $p < 0.0001$ )

## DISCUSSION

The present study shows that the Menopausal women were characterized by altered Oxidative stress marker i.e., MDA and Antioxidant status during the Postmenopausal age. This study results are consistent with the findings of a previous study comparing MDA levels between fertile and postmenopausal age groups.<sup>8</sup> Furthermore, two recent studies shown that the investigating the effect of surgical menopause on oxidant and antioxidant status of perimenopausal patients, revealed that MDA levels were increased after surgical menopause.<sup>7,9</sup> Furthermore, the study had been done on lipid peroxidation and lipid metabolism in postmenopausal women and the results of the study suggest that the aging & lack of estrogen may be responsible for the increase in MDA levels.<sup>10,11</sup> Menopause is a natural step in the process of aging hence; postmenopausal women are likely to develop oxidative stress because of estrogen deficiency and an advancing age, accompanied with age related changes.<sup>12,13</sup> It is evident from the study that there is decreased antioxidant defence in postmenopausal women as compared with premenopausal women which play an important role in the pathogenesis of various diseases related to menopause. Supplementation in diet can fulfil any deficiency of antioxidant. Therefore, antioxidant supplementation in post-menopausal women along with or as a substitute to hormone replacement therapy is found to be beneficial.

## CONCLUSION

We identified that the serum Malondialdehyde level was significantly increased in Post-menopausal women & Antioxidant status was significantly decreased. But in-case of premenopausal women it is reversal i.e., there were decreased MDA level & increased Antioxidant level. According to above study the accurate intervention of oxidative stress and antioxidant status can be used as early marker for the detection of Menopausal age; accordingly, we can treat at early menopausal age by giving supplementation in diet & also can be treated by hormone replacement therapy. Yet more research with a bigger sample size is required to verify this proposal.

## REFERENCES

- George S.A. The menopause experience: A women's perspective. Journal of obstetric, gynecologic, neonatal nursing, 2002;31(1): p 77-85.
- Pedubidri VG, Daftary SN editors. Howkins & Bourne Shaw's Textbook of Gynecology, 14th ed. Noida, India. Elsevier, 2008; p 52 – 53.
- Agarwal A, Aponte-Mellado A, Premkumar BJ, Shaman A, Gupta S. The role of oxidative stress of female reproduction: A review. Reprod Biol Endocrinol. 2012;10: p 1–32.

4. Ruder EH, Hartman TJ, Bumberg J, Goldberg MB. Oxidative stress and antioxidants: Exposure and impact on female infertility. *Hum Reprod Update*. 2008;14: p 345–57.
5. Wang Z, Chandrasena ER, Yuan Y, Peng KW, van Breemen RB, Thatcher GR, Bolton JL. Redoxcycling of catechol estrogens generating apurinic/aprimidinic sites and 8-oxo-deoxyguanosine via reactive oxygen species differentiates equine and human estrogens. *Chem Res Toxicol*. 2010;23: p 1365–73.
6. Rannevik G, Jeppsson S, Johnell O, Bjerre B, Laurell-Borulf Y, Svanberg L. A longitudinal study of the perimenopausal transition: Altered profiles of steroid and pituitary hormones, SHBG, and bone mineral density. *Maturitas*. 1995;21: p 103–13
7. Kumru S, Aydin S, Aras A, [et al.]. Effects of surgical menopause and estrogen replacement therapy on serum paraoxonase activity and plasma malondialdehyde concentration. *Gynecol Obstetric Invest*. 2005, 59 (2), pp 108–112.
8. Signorelli SS, Neri S, Sciacchitano S, [et al.]. Behaviour of some indicators of oxidative stress in postmenopausal and fertile women. *Maturitas*. 2006, 53 (1), pp 77–82.
9. Kaur G, Mishra S, Kaur A, [et al.]. Retention of ovaries and oxidative stress of surgery. *Int J Gynaecol Obstet*. 2007; 97(1): 40–3.
10. Mallick AK, Das B, Ahsaan M, Saxena S et.al. A correlation study between lipid peroxidation and dyslipidemia in postmenopausal women. *Sch. J. App. Med Sci* 2015;3(2B):669-73.
11. Onvural B, Oztore H, Onvural A, Fadiloglu M. Lipid peroxidation and lipid metabolism in postmenopausal women. *Tr. J of Medical Sciences*, 1998; 22: pp 519-524.
12. Bhagya, V., Hemalatha, N. R., Veeranna, B., & Banu, V. (2011). Serum lipid profile in prepubertal reproductive and postmenopausal women. *Int J Biol Med Res*, 2011; 2(3): 624-39.
13. Petty, M. A., & Bolkenius, F. N. *Tissue Directed o-Tocopherol Analogs. Handbook of Synthetic Antioxidants*, 1997; 3, pp 53.

**Source of Support:** Nil. **Conflict of Interest:** None Declared.

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**Cite this article as:** Kedar Prasad Yadav, Jyoti Batra, Rubi Yadav. Association Between Malonaldehyde and Antioxidant Status in Menopausal Women in a Tertiary Care Teaching Hospital. *Int J Med Res Prof*. 2021 May; 7(3): 22-25.  
DOI:10.21276/ijmrp.2021.7.3.007