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Oxidative Stress and Superoxide Dismutase (SOD) Activity in Post Menopausal Women

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Abstract: ***Menopause is a natural step in the process of ageing and oxidativestress has been proposed as important causative agents of ageing. The main objective of the present study is to know the status of antioxidant enzymes (SOD) in Pre and postmenopausal women and to find their correlation with lipid profile.***

Keywords: Super Oxide Dismutase, Oxidative Stress, Hormonal imbalance, Pre and Post Menopausal women, Lipid Profile, Antioxidant

1. Introduction

The process of ageing is enhanced due to the damage caused by free radicals; hence menopausal women are proposed to develop oxidative stress because of estrogen deficiency and advancing age *(Srivastava V 2005)*. Oxidative stress influences the entire reproductive lifespan of a woman and even thereafter i.e. menopause *(Agrwall A 2005)*.

The main objective of the present study is to know the status of antioxidant enzymes (SOD) in Pre and postmenopausal women and to find their correlation with lipid profile.The blood samples were analyzed for plasma lipid pre-oxidation 5, reduced glutathione 6 and antioxidant enzymes like glutathione peroxidase 7, catalase 8 and superoxide dismutase 9. Lipid profile was done by standard kit method (Span / Diagnostic Ltd.), and estrogen was estimated by Omega Kit method. Metal analysis (copper, iron and zinc) was done by atomic absorption spectrophotometer [(AAS)-Model Analyst 100 Perkin Elmer USA]. For statistical analysis, post-menopausal women were compared to pre-menopausal women treated as control. Statistical analysis was done by using softwares.

Oxidative stress influences the entire reproductive lifespan of a woman and even thereafter i.e. menopause.Theantioxidant system seems to be affected in post-menopausal women due to deficiency ofestrogen, which is a powerful antioxidant.

2. Material and Method

200 cases diagnosed with menopause from Gynaecology OPD of Glocal Medical College and Super Speciality Center was chosen for the present study. The study group was divided in two groups; first 100 subjects were post-menopausal while rest 100 were pre-menopausal women served as control group. The blood samples were analyzed for Lipid Profile, SOD. T-test and Pearson correlation co-efficient were applied for statistical analysis.

Inclusion Criteria

- Post-menopausal women with minimum two year amenorrhea were selected.
- Pre-menopausal age group (30- 45 years)
- Post-menopausal age group (45- 60years)

Exclusion Criteria

The subjects suffering from hypertension, cardiovascular diseases, diabetes, and venereal diseases were excluded from the study.

Women taking oral contraceptives, antioxidants or any other drug were also excluded from the present study.
Written consent was taken from each case, and all ethical measures were followed prior to the study.

3. Discussion

5ml blood samples were drawn from post-menopausal and pre-menopausal women at early morning in plane vacationer. Blood samples allowed clotting for 5-10 min and then immediately centrifuged at 3000rpm for 10min. Serum were separated from the clotted blood and refrigerated at -200C until analysis the next day.Blood sample status of antioxidants was determined by spectrophotometric estimation of Superoxide Dismutase (SOD). Data obtained was analyzed by T-test, ANOVA, and Pearson's correlation coefficient (r). $P < 0.05$ was considered significant.

- **Biochemical analysis**

All collected samples of the study populations' serum, lipid profile and SOD activity fasting were estimated. All reagents, calibrator, controls and samples were brought to room temperature before starting the test run. We measured serum lipid profile by standard methods on an automated chemistry analyzer(VITROS ECi/ECIQ) and SOD activity measured by ELISA and SPECTROPHOTOMETER.

- **Statistical Analysis**

Done in Microsoft Excel; Firstly data were coded in Microsoft Excel then analyzed by analysis of variance (ANOVA) in Microsoft Excel. We have taken p value 0.05 as a standard. The p value <0.05 is significant.

Table 1: Statistical Findings

Type of Subject	HDL-C	LDL-C	VLDL-C	Total-cholesterol	TG-C	SOD
Pre-Menopause (n=100)	54.05 ± 14.03	93.30 ± 37.77	29.40 ±24.84	171.95±40.33	120.90±36.26	4.80±1.73
Post-Menopause (n=100)	51.5 ± 12.20	106.6 ± 40.35	31.6 ± 13.28	197± 33.74	157.65 ± 66.53	1.35 ± .58

4. Findings

Table 2: Mean levels of lipid profile factors in pre menopausal women

Mean age of the sample	Mean HDL	Mean LDL-C	Mean VLDL-C	Mean T.CHL	Mean T.G-C	Mean SOD
38yrs	54.05	93.30	29.40	171.95	120.90	4.82

Observation:

- The HDL-C is found maximum in the women of age group 36 to 40 years and minimum in the women of 35 years.
- The LDL-C is maximum in the women of age 33 years and minimum in the women of 43 years.
- Regarding the VLDL-C were found a very different pattern i.e. maximum in the age 40 years and minimum in the age 43 years.
- The total cholesterol is found maximum in the women of 33 years and minimum in women of 43 years.
- The total glucose is found maximum in the women of age 36 years and minimum in the woman of 43 years.
- The SOD level is seen highest in the women of 33 years and lowest in the woman of 43 years in age.

Table 3: Mean Levels of Post- Menopausal Women

Mean Age	Mean HDL	Mean LDL-C	Mean VLDL-C	Mean T.CHL	Mean Tg -C	Mean SOD ACTIVITY
61.6	51.42	103.66	31.18	195.85	155.56	1.04

Observation

- The HDL-C is found maximum in the women of 56 years and minimum in the women of 65 years.
- The LDL-C is maximum in the women of age 70 years and minimum in the women of 63 years.
- Regarding the VLDL-C were found maximum values in the age 70 years and minimum in the age 63 years.
- The total cholesterol is found maximum in the women of 70 years and minimum in women of 60 years.
- The total glucose is found maximum in the women of age 70 years and minimum in the woman of 63 years.
- The SOD level is seen highest in the women of 59 years and lowest in the woman of 62 years in age.

5. Results

The Mean value of SOD is more in Pre–menopausal women **(4.80 ± 1.73)** as compared to Post-menopausal women **(1.35 ± .58)**. These variation were significant **(p <0.05).** Findings of this study corroborate the hypothesis that gradual loss of ovarian function is associated with a concomitant decrease in antioxidant status.

6. Conclusion

The study reveals that, there is enhanced oxidative stress and decreased antioxidant defence mechanism in post-menopausal females compared to pre-menopausal women which can play an important role in the pathogenesis of the various diseases related to menopause. Therefore antioxidants in the form of micronutrients and vitamins can be given as supplements in postmenopausal women along with or as a substitute to hormone replacement therapy.

Findings of this study corroborate the premise that gradual loss of ovarian function is associated with a concomitant rise in oxidative stress as exhibited both by decreased levels of antioxidants in pre and post-menopausal women. We suggest further studies on this issue which may involve larger sample size, additional parameters, and may also look into the nutritional aspects especially in reference to non-enzymatic anti-oxidants, so that the intricate relationship between menopause and oxidative stress is understood more clearly and such knowledge may contribute in attenuation of distress caused by menopause to half of the world's population.

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