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Repercussion of Lipid Peroxidation on Ovulation Cycle of Female

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ABSTRACT

Reproduction in human is a very complex process which includes appropriate working of both male as well as female reproductive system and the various hormones of the system respectively. Lipid peroxidation due to increase free radicals is a very common condition cause by excess amount of free radicals and oxidative stress. In the present scenario infertility is a common health problem experienced by many couples. This study is design to find out the relation of lipid peroxidation whose main cause is oxidative stress with hormones those are responsible for female ovulation and fertility. To achieve this aim 500 married female were included for the study in which 250was fertile and 250 was infertile females of the age group 25-35.Estrogen,Progesterone and Follicular Stimulating Hormones were analyzed with all females at their different phases of ovulation cycle. It is concluded with the study that there is a negative correlation of MDA with the Estrogen, Progesterone and Follicular Stimulating Hormones.MDA is the product produced by lipid peroxidation indicates that in the present living culture females are suffering from the different type of stress which leads the infertility and other complications related with the ovulation process.

Key words: *Infertility, Oxidative stress, MDA, Estrogen, Progesterone, FHS*

INTRODUCTION

In recent years it has become apparent that the oxidation of lipids, or lipid peroxidation, is a crucial step in the pathogenesis of several disease states in adult and infant patients. Lipid peroxidation is a process generated naturally in small amounts in the body, mainly by the effect of several reactive oxygen species. It can also be generated by the action of several phagocytes. These reactive oxygen species readily attack the polyunsaturated fatty acids of the fatty acid membrane, initiating a self-propagating chain reaction. The destruction of membrane lipids and the end-products of such lipid peroxidation reactions are especially dangerous for the viability of cells, even tissues[1]. MDA appears to be the most mutagenic product of lipid peroxidation[2]. MDA has been widely used for many years as a convenient biomarker for lipid peroxidation of omega-3 and omega-6 fatty acids because of its facile reaction with thiobarbituric acid[3].

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MDA is an end-product generated by decomposition of arachidonic acid and larger PUFAs[4], Oxidative destruction of polyunsaturated fatty acids by lipid peroxidation is damaging the integrity of cell membranes by producing free radicals. There are two major types of free radical species—ROS and reactive nitrogen species (NOS). In a healthy body, ROS and antioxidants remain in balance. When the balance is disrupted towards an overabundance of ROS, the physiological condition is called Oxidative Stress. Oxidative stress (OS) affects multiple physiological processes, from oocyte maturation to fertilization, embryo development and pregnancy. It has been suggested that the age-related decline in fertility is modulated by OS. OS plays a role during pregnancy and normal parturition and in initiation of pre-term labor. OS can affect sperm and oocyte quality, the fertilization process, and the embryo[5]. Menstruation in females is the regular natural change that occurs in the female reproductive system that makes pregnancy possible[6].The menstrual cycle is governed by hormonal changes[7].Each cycle can be divided into three phases based on events in the ovary (ovarian cycle) or in the uterus (uterine cycle).The ovarian cycle consists of the follicular phase, ovulation, and luteal phase whereas the uterine cycle is divided into menstruation, proliferative phase, and secretary phase[8].It is reveals from the previous research that MDA found high in infertile female as well as progesterone and Follicular stimulating hormones levels are low in infertile female when compared it with fertile females[9].By keeping this fact in mind the present study is designed to evaluate the correlation between MDA and reproductive hormones which leads the ovarian cycles and ultimately female fertility.

MATERIALS AND METHODS

The present study were carried out in faculty of Health Sciences, SHIATS and the experimental protocol was approved by the Institutional Ethical Committee in the meeting held on 3rd October 2011, Reg No-2011/A/010. The blood sample of infertile and fertile married females having child bearing age (25-35yrs) without any metabolic disorder (known from the history of the patient) from different gynecologist clinical hospitals and infertility centers of Allahabad were collected. The present study was carried out by collecting venous blood sample (5ml) of fertile and non fertile selected married females in Allahabad. Collection of blood sample was done thrice according to the days of their menstrual cycle for both fertile and infertile selected married females to analyze the level of the hormones during different phases of menstruation i.e. 5th -12th day of menstrual cycle for follicular phase of hormonal analysis,12th -14th day of menstrual cycle for mid leutal phase of hormonal analysis and 15th -28th day of menstrual cycle for leutal phase of hormonal analysis.Group I is consist of 250 fertile married females having children.(Fertile group) and Group II having 250 infertile married females not having children.(Infertile group) The level of Melondialdehyde was determined by procedure described by Satos,1978[10]. The hormones were analyzed by using ELISA method[11].

RESULTS AND DISCUSSION

The results for the correlative study in between MDA and estrogen is displayed in the table 1.A significant negative correlation was found between MDA and estrogen in the different phases of ovulation. The estrogen had a significant ($p<0.05$) negative correlation with MDA in the follicular phase of ovulation ($r = -0.1257, p<0.00001$).In the mid leutral phase ($r = -0.3223, p<0.00001$) as well as the leutal phase of ovulation ($r = -0.122, p<0.00001$).Thus with the negative correlation study value it indicated that increase in the MDA formation will lead the reduction in the estrogen hormone synthesis and effects their secretion in the body.

The results for the correlative study in between MDA and progesterone during different phases of ovulation is displayed in the table 2.The correlation study between

MDA and progesterone is found significantly negative in the different phases of ovulation($p<0.05$). The progesterone had a significant negative correlation with MDA in the follicular phase of ovulation ($r = -0.2529, p= 5.605$).In the mid leutral phase ($r = -0.3822, p<0.00001$) as well as the leutral phase of ovulation ($r = -0.467, p=0540$).

The results for the correlative study in between MDA with FSH during different phases of ovulation is displayed in the table 3.The correlation study between MDA and FHS is found significantly negative in the different phases of ovulation($p<0.05$). The FHS had a significant negative correlation with MDA in the follicular phase of ovulation ($r = -0.1418, p= 0.257$).In the mid leutral phase ($r = -0.289, p= 1.305$) as well as the leutral phase of ovulation ($r = -0.062, p=0.3211$). From the results is is clearly indicated that MDA has a negative correlation with estrogen, progesterone and FHS. It means the increase in the value of one variable may cause decrease in the other variable. Here high value of MDA is responsible for reduction of ovulation. This finding is also supported with the finding of Rajeshwary *et al.*,[12]. Thus it can be easily understood that increase in the oxidative stress reduces the level of the reproductive hormone which may cause infertility. The possible reason for this decrease found in the infertile group in the estrogens and progesterone hormone level in the three phase of ovulation may be because both these hormones are produced from the ovary ie estrogens from the follicle and progesterone from the corpus luteum whereas FSH from the pituitary gland which stimulates ovary to develop and mature follicle .Many studies done earlier have shown that the increased level of reactive oxygen species play a critical role in the folliculaogenesis as well as corpus lutal function[13]**.** Estrogen also has antioxidant effects so its deficiency during stress may lead an over production of ROS [14] which subsequently interferes with omocyte maturation induced embryo fragmentation, implantation failure or abortion[15].

Table 1: Correlative value of Serum MDA with Estrogen during different phases of ovulation in infertile women

MDA versus Estrogen	Parameters	r Value	p Value	Significance level
	Follicular Phase	-0.1257	<0.00001	Significant at p<0.05
	Mid Leutal Phase	-0.3223	<0.00001	Significant at p<0.05
	Leutal Phase	-0.122	0.0540	Significant at p<0.05

Table 2: Correlative value of Serum MDA with progesterone during different phases of ovulation in infertile women

MDA versus Estrogen	Parameters	r Value	p Value	Significance level
	Follicular Phase	-0.2529	5.605	Significant at p<0.05
	Mid Leutal Phase	-0.3822	<0.00001	Significant at p<0.05
	Leutal Phase	-0.467	<0.00001	Significant at p<0.05

Table 3: Correlative value of Serum MDA with Follicular Stimulating Hormone during different phases of ovulation in infertile women

MDA versus Estrogen	Parameters	r Value	p Value	Significance level
	Follicular Phase	-0.1418	0.0257	Significant at p<0.05
	Mid Leutal Phase	-0.289	1.305	Significant at p<0.05
	Leutal Phase	-0.063	0.3211	Significant at p<0.05

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REFERENCES

1. Mylonas, C. and Kouretas, D., In vivo lipid peroxidation and tissue damage, **13(3):** 295-309 (1999).
2. Esterbauer, H. P., Eckl, D. and Ortner, A. Possible mutagens derived from lipids and lipid precursors. *Mutation Research.* **238(3):** 223–233 (1990)
3. Esterbauer, H and Cheeseman, K.H., Determination of aldehydic lipid peroxidation products: malonaldehyde and 4-hydroxynonenal. Methods in Enzymology. **186:** 407–421 (1990).
4. Esterbauer,H., Schaur,R.J. and Zollner,H. Chemistry and Biochemistry of 4-hydroxynonenal, malonaldehyde and related aldehydes. *Free Radical Biology and Medicine.* **11 (1):** 81–128 (1991).
5. Ashok, A. and Sajal, G. Role of free radicals and antioxidants on female fertility. *Genito-Urinary diseases*.**13:** 60-66 (2006).
6. Silverthorn, S. and Unglaub, D. Human Physiology: An Integrated Approach (6th ed.). Glenview, IL: Pearson Education, Inc. pp. 850–890. ISBN 0-321-75007-1 (2013).
7. Kristin, H. L. Human Reproductive Biology. *Academic Press.* **3:** 53-54 (2013).
8. Derntl, B., Hack, R.L., Kryspin-Exner, I. and Habel, U. Horm Behav. **63 (1):** 97–104 (2013)
9. Ekta, A. and Sapna, S. L. Impact of oxidative stress on reproductive hormones in fertile and non fertile females. *International journal of Science and Reseach,* **4(5):** 1961-1963 (2015).
10. Satoh, K.. Serum lipid peroxide in cerebrovascular disorders determined by new colorimetric method. *Clin.Chem. Aceto.* **90:** 37-43 (1978).
11. Stricker, R., Eberhart, R., Chevailler, M.C., Quinn, F.A., Bischof, P. and Stricker, R. Establishment of detailed reference values for luteinizing hormone, follicle stimulating hormone, estradiol and progesterone during different phases of the menstrual cycle on the Abbott Architect analyzer. *Clin. Chem. Lab. Med.* **44(7):** 883-887 (2006).
12. Rajeswari, P.M., Nagarpasanth, S., Salma, M. R., Obulesu, G. Evaluation of oxidative strees marker in infertile women. *International Archies of Integrated Medicines*. **3(10):** 239-244 (2016)
13. Das, P. and Chowdary, M. Vitamin E induced changes in overy and uterus. *Molecular cell Biocem*. **198:** 151-156 (1999).
14. Sugino, N., Karube-Harada, A., Taketani, T., Sakata, A. and Nakamura, Y. Withdrawl of overian steroids stimulates prostaglandin F2 alpha production through nuclear factor Kappa B activation via oxygen radicalsin human endometric stromal cells. *Journal of Reproductive Development*. **50:** 215-225 (2004).
15. Agrawal, A., Gupta, S., Shekol, L. and Shah, R. Redox consideration in female reproductive function and assisted reproduction. *Antioxidant and Redox Signaling*, **10:** 1375-1403 (2008).