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ASSESSMENT OF OXIDATIVE STRESS VIA 8-*ISO* PROSTAGLANDIN $F_{2\alpha}$ (8-*iso*$PGF_{2\alpha}$) IN FEMALES WITH INFERTILITY

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Abstract: **The fact that hormonal imbalance leads to infertility has long been documented, evidence is also accumulating that oxidative stress plays a great role in female infertility. The present study comprises of 83 infertile women and 59 control subjects attending Rasheed Shekoni specialist hospital Dutse. All the analytes were analyzed using ELIZA technique. Serum levels of LH, FSH, PRL and 8-isopg $F_{2\alpha}$ of infertile subjects were statistically ($p<0.005$) higher than that of control of subjects. Conclusively, the infertility may be due to hormonal imbalance, oxidative stress or a combination of both factors.**

Keywords: **Infertility, Oxidative Stress, 8-isoPGF$_{2\alpha}$, fertility hormones.**

I. INTRODUCTION

Oxidative stress (OS) results when the generation of free radicals such as reactive oxygen species (ROS) or reactive nitrogen species (RNS) outweighs the capability of antioxidant system (Cindrova-Davies *et al.,* 2007; Al-Gubory 2010; Burton 2010). The imbalance between the prooxidant and antioxidant can lead to unfavorable environment for female biological system (Al-Gubory, 2010). Oxidative stress is associated with complications during pregnancy such as spontaneous abortion, recurrent pregnancy loss (RPL), pre-eclampsia, and intrauterine growth restriction (IUGR) (Webster, 2008). The role of ROS and antioxidant substances in the regulation of oocyte maturation, folliculogenesis, ovarian steroidogenesis and luteolysis has long been documented (Shiotani *et al.,* 1991; Behrman *et al.,* 2001; Sugino *et al.,* 2004). Determination of free radicals or their end products is complicated. Isoprostanes, derived from the non-enzymatic peroxidation of arachidonic acid are now considered to be reliable biomarkers and therefore assessment of bioactive 8-*iso*pg $F_{2\alpha}$levels offers a great opportunity to study oxidative stress-related diseases and inflammatory conditions (Murrow, *et al.,* 1990; Vacchiano and Tempel, 1994). Both Barrington *et al.,* (1996) and Vural *et al.,* (2000) reported that decreased antioxidant status increased risk of spontaneous abortion. Significant decrease of serum levels of ascorbic acid (vitamin C) and α-tocopherol (vitamin E) were observed among the women with recurrent abortion according to Vural *et al.,* (2000). OS has been reported to cause damage of cellular membrane, retard embryo development and induce cellular apoptosis (Rai and Regan, 2006; Stephenson and Kutteh, 2007). Assessment of Os proves to be important elements in the cases of infertility. Measurement of oxidative stress by various other methods lacks specificity and sensitivity, thus the current research reports the serum levels of 8-*iso* prostaglandin $F_{2\alpha}$ (8-*iso*pg $F_{2\alpha}$) of infertile women attending Rasheed Shekoni specialist Hospital.

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II. METHODOLOGY

***Study population*:** The current study comprises of 89 infertile women of age bracket 15-45 attending Rasheed Shekoni specialist Hospital Dutse and 59 apparently healthy age and sex-matched fertile subjects as controls.

Blood specimen Collection; Blood samples were collected by clean venopuncture into labeled plain test tubes, without undue pressure on either the arm or the plunger of the syringe. Four milliliters (4.0mls) of blood samples were collected by venopuncture and delivered into clean dry test tubes. The samples were allowed to clot at room temperature and centrifuged at 3000 rpm for 5 minutes to obtain the serum. The separated sera were transferred into sterile serum bottles and kept frozen at -20°C until used for the assay.

***Biochemical determination*:** 8-*iso*PGF$_{2\alpha}$ determination was based on competitive enzyme-linked immunoassay (ELIZA).

III. RESULTS

Table 1: Average Serum levels of 8-*iso*pg F$_{2\alpha}$ and some fertility hormones among infertile and control fertile subjects

Parameters	LH(mIU/ml)	FSH(mIU/ml)	PRL(ng/ml)	PROG()	8-*iso*pg F$_{2\alpha}$ (Pg/mL)
Infertile (n=83)	7.2±0.69	8.0±0.86	19.9±3.73	6.7±6.22	932.8±224
Control (n=59)	4.5±0.5	5.2±6.4	8.3±0.7	6.1±1.0	359.1±60.3

n=number of subjects; LH=Lieutenizing hormone; FSH=Follicle stimulating hormone; PRL=Prolactin; PROG=Progesterone;

Table 2: Serum levels of 8-*iso*pg F$_{2\alpha}$ (Pg/mL) among infertile women with respect to age groups

Parameters Age (yrs)	8-*iso*pg F$_{2\alpha}$ (Pg/mL)
15-24 (n=21)	**899±240**
25-34 (n=42)	**902±232**
35-44 (n=12)	**895±255**
44 and above (n=8)	**920±222**

n=Number of infertile subjects; yrs=years

IV. DISCUSSION

The problem of infertility in women may be due to obstruction of fallopian tube, uterine problems, hormonal imbalance, stress, obesity, other infections associated with reproductive system etc (Roupa *et al.,* 2009). Strong correlation between hormonal imbalance and infertility was documented among infertile women (Scott *et al.,* 1989; Ban *et al.,* 2013). According to the results obtained from this study serum levels of FSH, LH and Prolactin were significantly higher ($p<0.005$) in infertile women compared to the control subjects. This is in accordance with the findings of with Ban *et al.,* (2013) and Aroma *et al.,* (2014). FSH and LH play significant role in the development of follicles and oestrogen production. The present study revealed an increased prolactin levels in infertile women compared to control subjects, it is similarly reported by Parijatham and Saikumar (2014), Goswami *et al.,* (2009) and Kumkum *et al.,* (2006). Hyperprolactinemia among the infertile subjects shown in the current study may be responsible for the infertility, due to instrumental function of Prolactin in development and regulation of lactation and this may lead to amenorrhea, unexpected lactation, hypoestrogenism and lack of ovulation.

Serum levels of 8-*iso*pg F$_{2\alpha}$ among the infertile women were significantly ($p<0.005$) higher than the control subjects. The increase may be due overproduction of free radicals leading to lipid peroxidation and consequent elevation of 8-*iso*pg F$_{2\alpha}$. Infertile women with 44 years and above have highest concentration of 8-*iso*pg F$_{2\alpha}$ compared to other age groups, this may be due to aging and other factors.

V. CONCLUSION

In conclusion, serum FSH, LH, Prolactin and ISOPs were statistically higher in infertile women compared to control subjects and that infertility may be due to a combination of hormonal imbalance and oxidative stress.

VI. RECOMMENDATION

It is therefore recommended that infertile women should be routinely given antioxidants while being treated for infertility of hormonal aetiology.

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