



Original Research Article

## Assessment of Fertility Hormones among Infertile Men in Red Sea State, Sudan

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### ABSTRACT

**Introduction:** Male infertility is a common problem in Red Sea State, Sudan. In the majority the cause is previous exposure to venereal diseases, and in some cases there is no known cause of infertility. This study was aimed to assess the sperm count and the plasma levels of fertility hormones among men with history of infertility in Red Sea State, Sudan. **Materials and Methods:** A cross-sectional study was conducted in Port Sudan Teaching Hospital, Red Sea State, Sudan, during the period from March 2012 to March 2014, on 150 married men with a complain of infertility were assessed for the analysis of plasma levels of fertility hormones and the sperm count, along with 94 apparently health proven fathers as a control group. The test group and the control group were matched for age. SPSS was used for analysis of data. The data was compared using student's "t" test and Pearson's correlation was used for assessment of correlation between different variables. **Results:** This study showed that the mean of the sperm count of the test group was significantly reduced when compared with that of the control group , (  $p = 0.000$ ). The study also shows a significant increase of the means of the plasma levels of Follicle stimulating hormone , Luteinizing hormone and prolactin of the test group when compared with that of the control group , (  $p = 0.000$ ). There is no significant difference between the mean of the plasma levels of Testosterone of the test group and that of the control group,(  $p = 0.100$ ) . The present study shows no significant correlations between the plasma levels of Follicle stimulating hormone , Luteinizing hormone and prolactin hormone with that of Testosterone , and also shows no significant correlation between the plasma levels of Prolactin and Testosterone to the sperm count. The current study shows significant correlations of the plasma levels of Follicle stimulating hormone and Luteinizing hormone to the Sperm count. **Conclusion:** The present data indicates that among infertile men in Red Sea State, Sudan, the sperm count is significantly reduced, whereas the plasma levels of Follicle Stimulating Hormone, Luteinizing Hormone and Prolactin are significantly raised. The plasma levels of Follicle Stimulating Hormone, Luteinizing Hormone have significant positive correlations with the sperm count.

**KEY WORDS:** FOLLICLE STIMULATING HORMONE, LUTEINIZING HORMONE, PROLACTIN, TESTOSTERONE

## INTRODUCTION

Infertility is the commonest gynecological problem in our environment. Infertility can be defined as failure to conceive after 12 months of unprotected sexual intercourse. <sup>(1)</sup> It is classified as primary infertility if no previous pregnancies have occurred and secondary infertility if it occurred after one or more pregnancies. <sup>(1)</sup> Approximately 15% of couples attempting their first pregnancy meet with a failure, and another 10% face secondary infertility. <sup>(1)</sup> Data available over the past 20 years reveal that in approximately 30% of the cases of infertility, the pathology is found in the man alone, and in another 20%, both the man and the woman are abnormal. <sup>(2)</sup> Therefore, the male factor is at least partly responsible for the infertility in about 50% of cases. <sup>(2)</sup> Male fertility depends upon an intact hypothalamopituitary-testicular axis to initiate and maintain quantitatively and qualitatively normal spermatogenesis. <sup>(3)</sup> Sperm count is considered lower than normal if it is fewer than 20million sperm per ml of semen. <sup>(2)</sup> The initial evaluation of the male patient should be rapid, noninvasive, and cost-effective, as nearly 70% of conditions that cause infertility in men can be diagnosed with history, physical examination, and hormonal and semen analysis alone. <sup>(4)</sup> Thus, it is surprising how infrequent infertile males have a recognizable endocrinopathy, even though up to 20% of male infertility can be attributable to endocrinopathy. <sup>(5)</sup> In fact, endocrine disorders which may be associated with significant medical pathology remain an important factor to consider in the etiology of male infertility because they can be amenable to treatment. However, in clinical practice, endocrine evaluation is usually done only in patients with severe oligospermia or azoospermia. <sup>(6)</sup> The hormones initially evaluated include follicle stimulating hormone (FSH)

luteinizing hormone (LH), Testosterone and prolactin. <sup>(6)</sup> Although there were much data on infertility in other African countries, no data exist on infertility in Sudan. Seven hundred and ten Sudanese couples were investigated for infertility in Khartoum Fertility Center, Sudan: 443 (62.4%) had primary infertility and 267 (37.6%) had secondary infertility. A positive male factor alone was found in 257 (36.2%) couples and a female factor in 350 (49.3%) couples: eleven (1.5%) couples had a combination of male and female factors, and the cause of infertility was unexplained in 92 (13.0%) couples. Oligozoospermia and asthenozoospermia were factors responsible for 16.8% and 17.5% of male infertility, respectively. <sup>(7)</sup> Failure of ovulation (60.3%) was the most common cause of female infertility. <sup>(7)</sup> The study revealed a high proportion of secondary infertility and a greater contribution of the female factors to infertility.

## MATERIALS AND METHODS

A descriptive, analytical, case-control and, hospital-based study, was conducted in Port Sudan Teaching Hospital Red Sea State, Sudan, during the period from march 2012 to march 2014. Port Sudan is the capital of the Red Sea state; Sudan. It is located in the eastern of Sudan 815 km from Khartoum the capital of Sudan. Port Sudan Teaching Hospital and clinics serve Port Sudan population and other nearby towns such as Swakin and Sinkat. The test group was composed of 150 patients diagnosed as infertile men and 94 healthy fertile men as a control group for comparison. The study was approved by research board of the Faculty of Medical Laboratory Science, Sudan University of Science and Technology. Permission of this study was obtained from the local health authorities in the area of study and the medical director of Port Sudan teaching

hospital. The objectives of the study were explained to all individuals participating in the study and a written consent was obtained from each participant. A venous blood sample (5ml) was collected from each participant by standard procedure in heparin vacutainer and centrifuged immediately to obtain plasma. FSH, LH, PRL and Testosterone were measured immediately using Full automation technique.

## RESULTS

A total of 150 men with history of infertility, in addition to, 94 fertile men were evaluated for fertility hormones and sperm count. Table (1) shows Comparison between the means of the plasma levels of FSH, LH, PRL and Testosterone of the test group and the control group. This table shows a significant reduction of the mean of the sperm count of the test group when compared with that of the control group.

Variable	Test group (n=150)	Control(n=94)	P-value
Sperm count (million/ml)	4.41(3.45 - 5.37)	82.13(66.83 -97.43)	0.000
Pl. Follicle stimulating hormone(miu/mL)	14.79(11.99 – 17.59)	5.31(2.81 – 7.81)	0.000
Pl. Luteinizing hormone(miu/mL)	8.49(6.49 – 10.49)	5.01(2.21 – 7.81)	0.000
Pl. Prolactin hormone(ng/mL)	17.15(16.55 – 17.75)	14.04(9.54 – 18.54)	0.001
Pl. Testosterone(ng/dL)	533.39(280.1 - 746.67)	555.53(316.13 – 798.93)	0.100

Table (1) also shows a significant increase of the mean of the plasma levels of Follicle Stimulating hormone, Luteinizing hormone and Prolactin of the test group when compared to that of the control group. The same table also shows no significant difference between the mean of the plasma levels of Testosterone hormone of the test group and to that of the control group, ( $p = 0.100$ ).

Table 2: Correlation coefficients(r) for Plasma FSH ,LH, Prolactin with that of Testosterone among the test group.

Parameter	Correlation coefficients (r).	P. Value
FSH	-0.11	0.088
LH	-0.11	0.165
PRL	-0.03	0.362

*P. Value  $\leq 0.05$  is considered significant.*

The above table shows no significant correlations of the plasma levels of Follicle Stimulating hormone, Luteinizing hormone and Prolactin Hormone with that of Testosterone.

Table3: Correlation coefficients(r) for PlasmaFSH, LH, Prolactin and Testosteronewith that of the Sperm count among the test group.

Parameter	Correlation coefficients (r).	P. Value
FSH	0.57	0.018
LH	0.51	0.004
PRL	-0.03	0.371
Testosterone	0.04	0.658

*P. Value  $\leq 0.05$  is considered significant.*

**Table3** shows significant correlations of the plasma levels of Follicle Stimulating hormone and Luteinizing hormone with that of the sperm count. And shows no significant correlation of the plasma levels of prolactin hormone and Testosterone to that of sperm count.

## DISCUSSION

Diagnosis of infertility in both males and females has a global significance and require assessment of factors involved in males and females infertility. In the Red Sea State, Sudan, there is an obvious problem of

male infertility. The results of this study show a significant reduction of the mean of the sperm count of the test group when compared with that of the control group, ( $p = 0.000$ ). This could be due to previous infections that interfered with sperm production or sperm health or caused scarring that blocks the passage of sperm, such as sexual transmitted infections, including Chlamydia and gonorrhea in addition to prostatitis mumps, orchitis and other infections of the urinary tract or reproductive organs, environmental causes of low sperm count may be caused by heavy metal exposure (e.g. Lead) and radiation or x-rays. <sup>(8)</sup>

The present study also shows a significant increase of the mean of the plasma levels of Follicle Stimulating hormone (FSH) of the test group when compared with that of the control group, ( $p = 0.00$ ). This result agrees with the studies done by Geidam <sup>(9)</sup> and Sayed <sup>(10)</sup> who reported that the levels of FSH usually correlate inversely with spermatogenesis. Elevation of FSH occurs in men with intact hypothalamic – pituitary-adrenal axis when there is severe damage to germinal epithelium, and high FSH value is compatible with primary testicular failure. It has been known for a long time that low levels of inhibin causes raised levels of FSH. <sup>(10)</sup> The present study shows a significant weak correlation between the plasma levels of FSH and the sperm count.

The current study also shows a significant increase of the mean of the plasma levels of Luteinizing hormone (LH) of the test group when compared to that of the control group, ( $p = 0.00$ ). This agrees with a study done by Geidam et al, <sup>(9)</sup> who reported that the mean of the LH in the infertile group is higher than the reference range for fertile men. The present study also shows a significant weak relationship between the plasma levels of Luteinizing

hormone and the sperm count ( $p = 0.004$ ) among the test group. This means a secondary increase of LH occur as a result of reduction in the sperm count. Elevated levels of FSH or LH usually reflect lack of steroid negative feedback in human and excessive secretion of FSH and LH most commonly the result of gonad failure or pituitary tumor. <sup>(11)</sup>

The current study also shows a significant increase of the mean of the plasma levels of prolactin hormone of the test group when compared to that of the control group ( $p = 0.001$ ), Syed <sup>(10)</sup> study said PRL is elevated in patients with normal count of sperm but infertile and we find that PRL is elevated in test group patients whom we know they had low sperm count, as the Carter JN <sup>(12)</sup> said is noteworthy, as it may signify Prolactin-secreting pituitary adenoma, which is amenable to therapy, however, as Prolactin elevation may be induced by some abnormalities of the thyroid gland, further evaluation of these patients should include pituitary imaging and thyroid function test. Hyperprolactinaemia cause infertility in around 11% of oligospermicmales. Hyperprolactinaemia produce secondary hypogonadism and infertility. <sup>(13)</sup>

## CONCLUSION

The present data indicates that among infertile men in Red Sea State, Sudan, the sperm count is significantly reduced, whereas the plasma levels of Follicle Stimulating Hormone, Luteinizing Hormone and Prolactin are significantly raised. The plasma levels of Follicle Stimulating Hormone, Luteinizing Hormone have significant positive correlations with the sperm count.

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