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RESEARCH ARTICLE

EVALUATION OF FOLLICLE STIMULATING HORMONE, TESTOSTERON AND FACTORS RESPONSIBLE FOR MALE INFERTILITY IN KHARTOUM-SUDAN

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ABSTRACT

Background: Gonadotropin (FSH) and testosterone abnormalities are usually associated with abnormal spermatogenesis.
Aim: This study aimed to evaluate Follicle stimulating hormone and Testosterone among Sudanese infertile population.
Methods and Materials: The frequent descriptive cross-sectional study was conducted during the period from October 2014 to March 2015 in which a total of ninety infertile men all over three years of infertile condition and ten age-matched controls with proven fertility were selected for the study. Follicle stimulating hormone (FSH) and testosterone levels were estimated by fully automated AIA 360 (TOSOH) using the manufacturer kits. The participants' semen sample were collected and proceeded according to WHO manual guidelines. The data and the hormonal results were analyzed using SPSS version 16.
Results: A hundred participants volunteered in this study, ten of them were fertile and ninety were infertile. All of the participants fall into age ranged from (25-60 years). Out of 90 infertile males, 69(76.7%) were azospermic and 21(23.3%) were oligospermic. In comparing FSH and Testosterone levels of infertile and fertile group, it's appear that there is a significant statistical relationship (P value = 0.000). When comparing the means of FSH, and Testosterone regarding infertile subgroups of azospermia and oligospermia it found that there was statistical significant relationship of Testosterone hormone (P value = 0.01), unlike FSH hormone which revealed insignificant relation (P value 0.54)
Conclusion: Elevation levels of gonadotropin (FSH) hormone and decreasing levels of Testosterone hormone will directly affect the spermatogensis process leading to condition known as infertility.

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INTRODUCTION

Infertility is defined as the inability of a couple to conceive after at least 12 months of unprotected sexual intercourse. It occurs worldwide but differs in incidence and prevalence. Infertility is a common gynaecological problem affecting 15% of couples attempting their first pregnancy, in which case it is called primary infertility; while those with secondary infertility are about 10% of the population. Secondary infertility could be as high as 52% in some sub-Sahara African countries and as low as 23% in some Asian countries (Larsen, 2000).

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Infertility is a common disorder and nearly one out of every six to eight couples suffers from it at any given time. Infertility among couples in their respective age is more common than hypertension, diabetes, heart diseases and even the common flu (Ahmed, 1998). Globally, it has been estimated that approximately 10-15% couples seek medical help for the problem of infertility. In 20-25% cases the problems are attributable to the male partner, while 30-40% represent female factor. In approximately 30% of cases both partners and in 15% no specific factor can be identified (World Health Organization, 1997). The successful and complete male germ cell development is dependent on the balanced endocrine interplay of hypothalamus, pituitary and the testis. Gonadotropin releasing hormone (Gnrh) secreted by the hypothalamus elicits the release of gonadotrophins i.e. follicle

stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary gland (De Krester, 1979). FSH binds with receptors in the sertoli cells and stimulates spermatogenesis. LH stimulates the production of testosterone in Leydig cells, which in turn may act on the Sertoli and peritubular cells of the seminiferous tubules and stimulates spermatogenesis (O'Donnell *et al*., 1994). The failure of pituitary to secret FSH and LH will result in disruption of testicular function leading to infertility. Testosterone, estradiol and inhibin control the secretion of gonadotrophins through feedback mechanism (Weinbauer and Nieschlag, 1995). Semen analysis and hormone evaluation are essential parameters in giving a definitive diagnosis in infertile males (Guyton, 1981). Therefore, hormones measurement can help to determine whether the patient has gonadotropin deficiency, primary testicular failure, spermatogenic failure or androgen resistance. So this study was designed to evaluate the serum levels of FSH and Testosterone in infertile males.

MATERIALS AND METHODS

This study was a prospective cross sectional one carried out at an outpatient infertility clinic of a private hospital with a standard laboratory facility between October 2014 and March 2015. A total of ninety infertile men and ten age-matched controls with proven fertility were selected for the study. Informed consent was obtained from the subjects after the procedures had been explained to them. FSH and testosterone levels were evaluated in all the infertile men and controls. The hormonal assays were done by full automated AIA 360 (TOSOH) using the manufacturer kits (TOSOH ST AIA®-PACK Reproductive Hormone Assays). 5 ml fresh blood sample was aseptically collected from antecubital vein of each subject, transferred into a clean plain labeled tube, allowed to clot, and then centrifuged at 4000 rpm for 5 minutes at room temperature. The clear serum was separated and kept at 20 °C till assayed. FSH and Testosterone assessment were then tested. Semen was collected from the infertile subjects by copulation or masturbation, after haven abstained from sexual intercourse for a minimum of three days and a maximum of seven days, in a private room near the laboratory in order to limit the exposure of the semen to fluctuations in temperature and also to control the time between collection and analysis. The collection was done into a clean, dry, wide-mouthed container made of plastic that is non-toxic for spermatozoa. The specimen container was kept in an incubator at 30 °C temperature. The estimation of sperm counting was done using the Neubauer haemocytometer chamber. Sperm analysis was carried out according to the World Health Organization guidelines (World Heath Organization, 2010). Based on the sperm count, the subjects were classified as normospermia (> 20 million sperm /ml), oligospermia (<20 million sperm/ml) and azoospermia (no spermatozoa). In proven fertile controls, the sperm count ranged from 20 –120 million sperm /ml. The results obtained were analysed using descriptive statistics and student t-test with SPSS version 16.

RESULTS

The values and data obtained on analyzing specimens collected form infertile males and control groups are tabulated. The mean values and standard deviation also have been calculated for comparative study of infertile males and controls. The values of subject and controls groups are also graphically represented for comparison. Out of 90 infertile males, 69(76.7%) were azospermic and 21(23.3%) were oligospermic. There was significant increase in FSH levels in all groups of infertile males as compared to controls (P value = 0.00) (Table 1). Testosterone was a significantly decreased in infertile males in comparison of normal fertile males and the differences in the mean of testosterone levels between the control and test were found to be significant (P value = 0.00) (Table 1).

In comparing mean of gonadotropin FSH within different subgroup of infertile participants, it showed that the mean of FSH of azospermic group was higher than that of the oligospermic ones (P value =0.54) (Table 2). When comparing the means of Testosterone hormone levels in the infertile subgroups, it found that there was a slightly decreasing in oligospermic testosterone levels than those of azospermic group and there was a significant statistical correlation (P value =0.001) (Table 2)

The frequency of the FSH levels among test and control groups were illustrated in (Figure 1)

The frequency of the testosterone levels among test and control groups were illustrated in (Figure 2)

Regarding occupational status and testosterone, it found that there was a significant correlation in both infertile subgroups (P value <0.05). Unlike FSH hormone which had no such correlation (P value > 0.05) (Table 3)

Table 1. Showing Serum FSH and testosterone levels among fertile and infertile males

Hormone	Fertile (No = 90)	Infertile (No = 10)	**P value
FSH	*6.47 ± 2.73	38.1±14.30	0.00
Testosterones	588.50±197.803	351.31±183.88	0.00

*Results illustrated as mean ±SD
**The P. value was calculated using T. test
- P. value less than 0.05 considered significant.

Table 2. Showing Serum FSH and testosterone levels in different subgroups of infertile males and controls

Hormone	Oligospermia (No = 21)	Azospermia (No = 69)	**P value
FSH	*28.4 ± 9.82	41.15 ± 14.18	0.54
Testosterone	289.38 ± 118.96	370.16± 196.34	0.01

*Results illustrated as mean ±SD
**The P. value was calculated using T. test
- P. value less than 0.05 considered significant.

Table 3. Show the correlation of FSH and Testosterone among infertile and fertile

Sperm count report		Sig.
Oligospermia	FSH (mIU/ml) * Occupational status	0.386
	Testosterone (ng/dl) * Occupational status	0.040
Azospermia	FSH (mIU/ml) * Occupational status	0.165
	Testosterone (ng/dl) * Occupational status	0.017
Normospermia	FSH (mIU/ml) * Occupational status	0.669
	Testosterone (ng/dl) * Occupational status	0.565

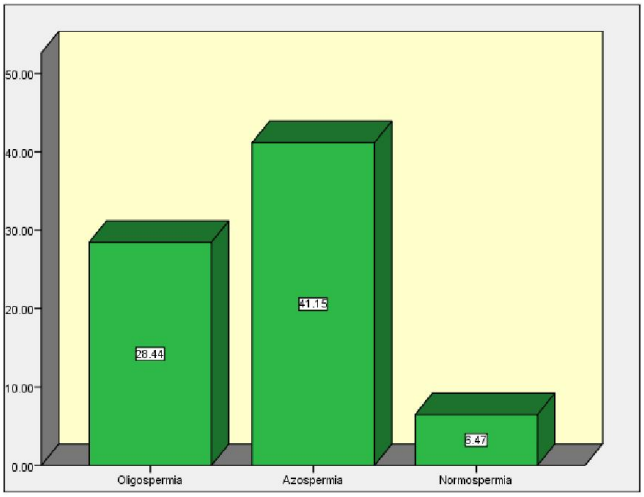

Figure 1. Illustrate the frequency of FSH among fertile and infertile participants

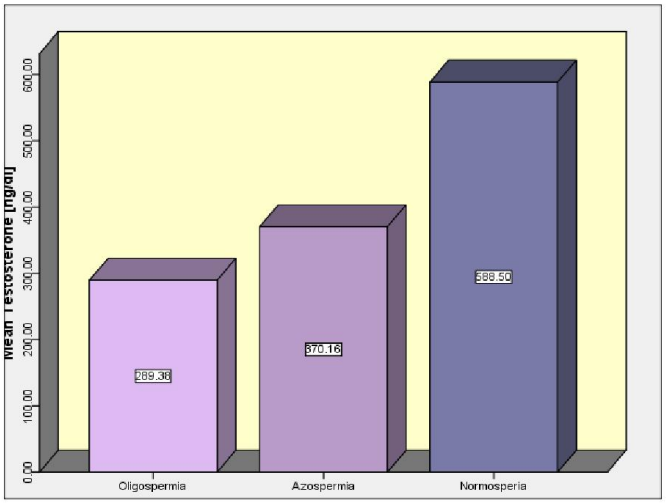

Figure 2. Illustrate the frequency of testosterone among fertile and infertile participants

DISCUSSION

It is important in the evaluation of male infertility to consider the reproductive hormone levels. It was reported that these hormones have a major role in male spermatogenesis (Emokpae *et al*., 2007). FSH and Testosterone evaluation is useful in the management of male infertility (Zabul *et al*., 1994). For initiation of spermatogenesis and maturation of spermatozoa, FSH found to be necessary. In the infertile men, higher concentration of FSH is considered to be a reliable indicator of germinal epithelial damage, and was shown to be associated with azoospermia and severe oligospermia (Bergmann *et al*., 1994). de Kretser *et al.* (1974) reported elevated levels of serum FSH with increasing sevedty of seminiferous epithelial destruction. In the present study, gonadotropin (FSH) levels were significantly elevated in infertile males when compared with the levels in proven fertile controls. These results are in accordance with the studies of Sulthan *et al.* (1985). Zabul *et al.* (1994), Weinbaurer and Nieschlag (1995), and Subhan *et al.* (1995) who showed elevated levels of follicle stimulating hormone in infertile males. Elevated levels of FSH in oligozoospermic and azoospermic males when compared to normal fertile men were also reported (Hopkinson *et al.,* 1977). Subhan *et al.* reported decreasing levels of testosterone hormone, the same findings was found in our present study. In the present study the difference in the mean serum testosterone levels between fertile and infertile men were significant $p < 0.05$. Similar observations were made by Smith *et al.* (1985) and Subhan *et al.* (1995).

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