Assessment of Prolactin and Testosterone Levels among Infertile Males in Khartoum, Sudan

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Abstract

Background: Male infertility is a common problem in Sudan. In the majority the cause is previous exposure to venereal diseases, and in some cases there is no known cause of infertility. Present study aimed to assess the levels of Prolactin and Testosterone hormones . among men with history of infertility in Khartoum State, Sudan and compare their means and study correlation between Prolactin and testosterone levels and participants age.

Materials and Methods: This was a cross sectional study conducted in Adam and Hawwa fertility center in Khartoum State, It included 120 infertile males, in period from May to June 2017. It included adult infertile males and apparently healthy individuals, and excluded adult males with sperm abnormalities, sexual transmitted diseases, chromosomal abnormalities and genetic disorders. It approved by ethical committee of the faculty of medical laboratory sciences, Alneelain University, and informed consent was obtained from each participant before sample collection and Ethical conduct was maintained during data collection and throughout the research process. All statistical analyses were performed by SPSS software version (20). Continuous variables were expressed as mean and standard deviation. In the analytical phase, "t" test was applied to compare averages. Comparison between groups was performed with paired sample t-test. P-value < 0.05 was considered significant.

Results: This study showed significant increase in the mean of the plasma levels of prolactin hormone among participants, whereas, serum testosterone level was significantly decrease. The result showed 55.8 % of patients have high level of Prolactin , while 44.2 % of patients have low level of Prolactin. Also the result showed that, 100% of patients have low level of testosterone.

Results of this study found that, there was no correlation between Prolactin level and age (r= o.151 , p, value = 0.099) while there was significant moderate negative correlation between testosterone level and age(r= - 0.323 , p, value= 0.014), also there was significant moderate negative correlation between testosterone level and Prolactin level (r = - 0.449 , p, value = 0.006)

In conclusion; the present data indicates that; among infertile men in Khartoum State, Sudan, serum Prolactin level was significantly increased, whereas the plasma levels of testosterone were significantly reduced. The plasma levels of serum testosterone had significant negative correlations with serum Prolactin level and age.

KEY WORDS: Infertile, Fertility Hormones, Prolactin, Testosterone.

INTRODUCTION

Infertility is a widespread problem. For about one in five infertile couples the problem lies solely in the male partner. [1] In most cases, there are no obvious signs of infertility, Intercourse, erections and ejaculation will usually happen without difficulty. The quantity and appearance of the ejaculated semen generally appears normal to the naked eye. Medical tests are needed to find out if a man is infertile.[2]

Male infertility is usually caused by problems that affect either sperm production or sperm transport, about two-thirds of infertile men have a problem with making sperm in the testes. Either low numbers of sperm are made and/or the sperm that are made do not work properly ,low levels of hormones made in the pituitary gland that act on the testes also may caused infertility like (Prolactin , LH ,FSH).[3]

Prolactin is a peptide hormone produced by the anterior pituitary gland that is primarily associated with lactation and plays a vital role in breast development during pregnancy. Elevated levels of prolactin in males signals the gonads to make less testosterone (hypogonadism). This means that hyperprolactinemia can indirectly but definitely cause decreased libido, erectile dysfunction demised ejaculate volume, and a low concentration of sperm (oligospermia). [4]

Study in HalaI Al-Daghistani Department of Medical Allied Sciences, Zarka University College, Al-Balqa Applied University, PRL level was found to be higher in azoospermia and sever oligospermia, whereas the mean LH and FSH were found to be higher in azoospermia. This might indicates some disturbance in the spermatogenesis process. [5]

Hadassah University Hospital, Jerusalem, Israel: Serum prolactin was studied in 25 fertile and 127 infertile men. The latter included 91 oligospermia, 27 azoospermia, and 9 hypogonadotropic hypo gonadal men. The mean prolactin level in all three groups of infertile men was significantly above that of the fertile group. [6]

Hyperprolactinemia causes infertility in around 11% of oligo sperm males. Hyperprolactinemia inhibits the pulsatile secretion of the gonadotropin releasing hormone, which causes decreased pulsatile release of follicle stimulating hormone, luteinizing hormone, and testosterone, which in turn causes spermatogenic arrest, impaired sperm motility, and altered sperm quality.[7]

Present study conducted to assess the levels of Prolactin and Testosterone, compare their means and study correlation between Prolactin and testosterone levels and participants age.

Materials and methods

This was a cross sectional study conducted in Adam and Hawwa fertility center in Khartoum State. It included 120 infertile males, in period from May to June 2017. It included adult infertile males and apparently healthy individuals, and excluded adult males with sperm abnormalities, sexual transmitted diseases, chromosomal abnormalities and genetic disorders. It approved by ethical committee of the faculty of medical laboratory sciences, Alneelain University, and informed consent was obtained from each participant before sample collection and Ethical conduct was maintained during data collection and throughout the research process. All statistical analyses were performed by SPSS software version (20). Continuous variables were expressed as mean and standard deviation. In the analytical phase, "t" test was applied to compare averages. Comparison between groups was performed with paired sample t-test. P-value < 0.05 was considered significant.

Blood sample and analysis:

 Standard vein puncture, 3 ml of blood sample collected into plain container and centerifugated at 3000 rpm for about 10 minutes and the serum harvested all and stored at -20 C until analyzed.

-The ST AIA-PACK PRL was a two-site immunoenzymometric assay, which was performed entirely in the AIA-PACK. Prolactin present in the test sample was bound with monoclonal antibody

immobilized on a magnetic solid phase and enzyme-labeled monoclonal antibody in the AIA-PACK. The magnetic beads were washed to remove unbound enzymelabeled monoclonal antibody and then incubated with a fluorogenic substrate, 4-methylumbelliferyl phosphate (4MUP). The amount of enzyme-labeled monoclonal antibody that bonded to the beads was directly proportional to the Prolactin concentration in the test sample. A standard curve was constructed, and unknown sample concentrations was calculated using standard curve.

-The ST AIA-PACK Testosterone was a competitive immunoenzymometric assay, which was performed entirely in the AIA-PACK. Testosterone presented in the test sample competed with enzymelabeled testosterone for a limited number of binding sites on the testosterone specific monoclonal antibody immobilized on a magnetic solid phase. The magnetic beads were washed to remove unbound enzyme-labeled testosterone and then incubated with a fluorogenic substrate, 4-methylumbelliferyl phosphate (4MUP). The amount of enzyme-labeled testosterone that binded to the beads was inversely proportional to the testosterone concentration in the test sample. A standard curve was constructed, and unknown sample concentrations was calculated using standard curve.

Results

Figure (1) Mean ± Std.D and correlation of Age, Prolactin and Testosterone
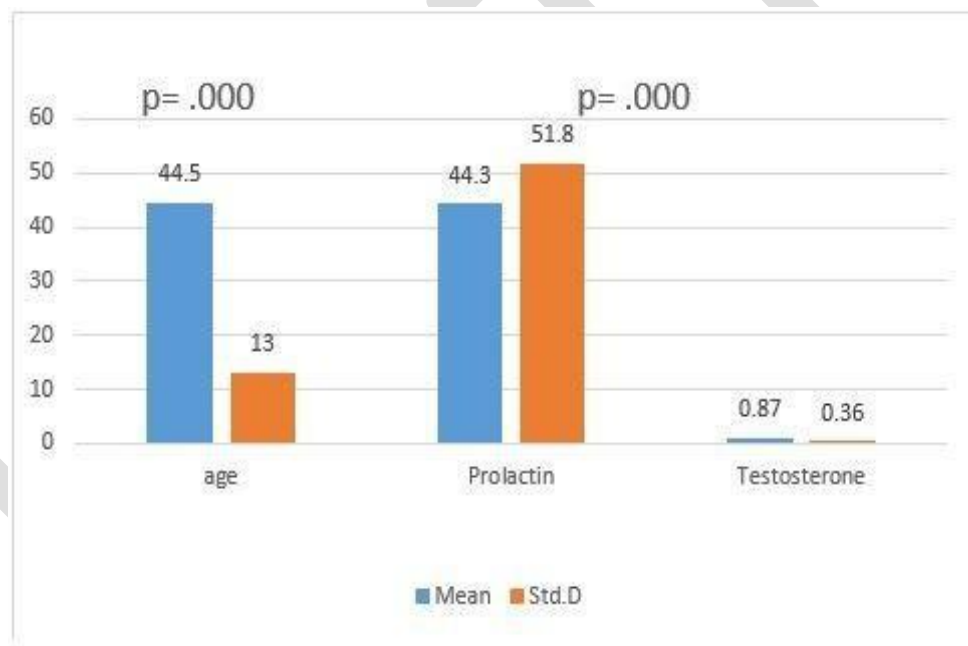
This study included 120 infertile males which conducted in Khartoum, Sudan from May to June 2017. The mean age of participants was (44.5) years and standard deviation was (13) years, there was a strong association of age with testosterone level (P=.000). Figure (1)

The mean of prolactin levels were very high (44.3 ± 59) ng/ml, whereas, the mean of testosterone levels were very low (0.87 ± .36) ng/ml, there was a strongly association between prolactin and testosterone levels (P=.000). Figure (1)

The frequency and percentage of high and normal levels of prolactin and testosterone showed that, 55.8 % of patients have high level of Prolactin , while 44.2 % of patients have low level of Prolactin. Also the result showed that, 100% of patients have low level of testosterone, as in table (1)

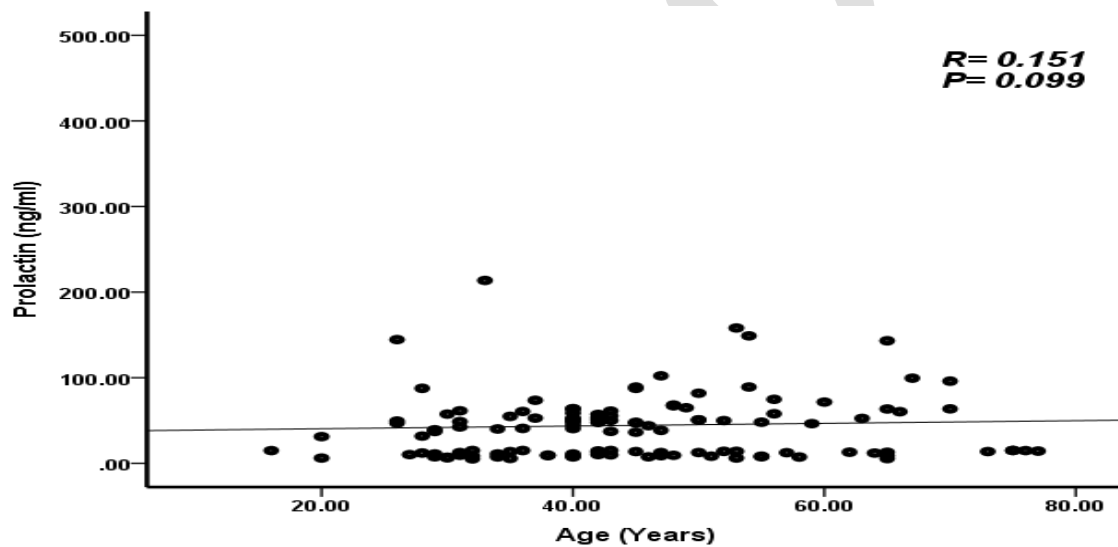| Variables	Frequency	Percentage (%)
Prolactin		
High	67	55.8 %
Normal	53	44.2 %
Testosterone		
Low	120	100 %
Normal	0.0	0.0 %
Total	120	100 %

Figure (2) correlation between prolactin level and age (r=0.151, p, value =0.099) there was insignificant moderate negative correlation .
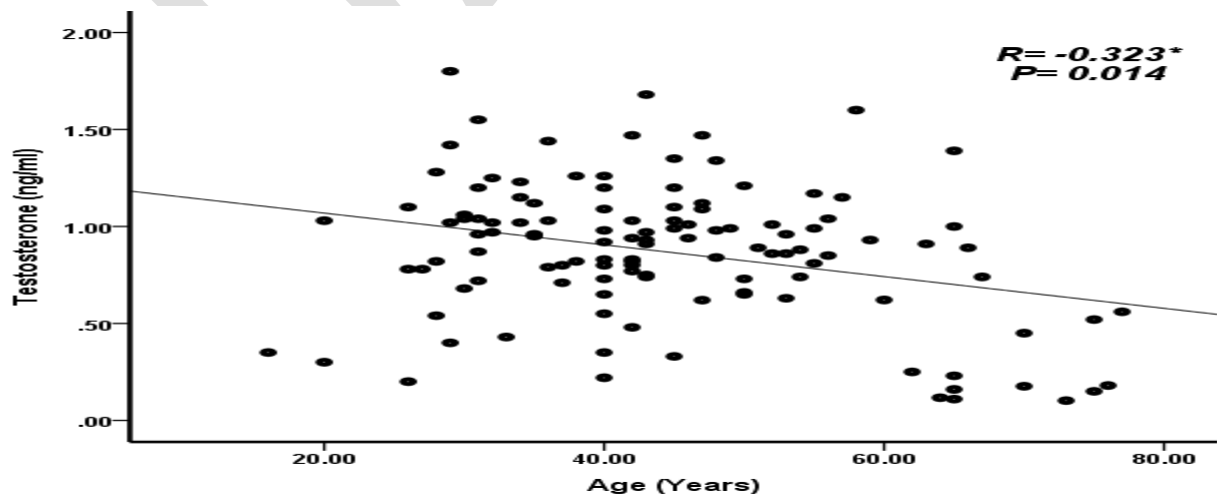

Figure (3) correlation between testosterone level and age (r=-0.323, p, value=0.014), there was moderate negative correlation.
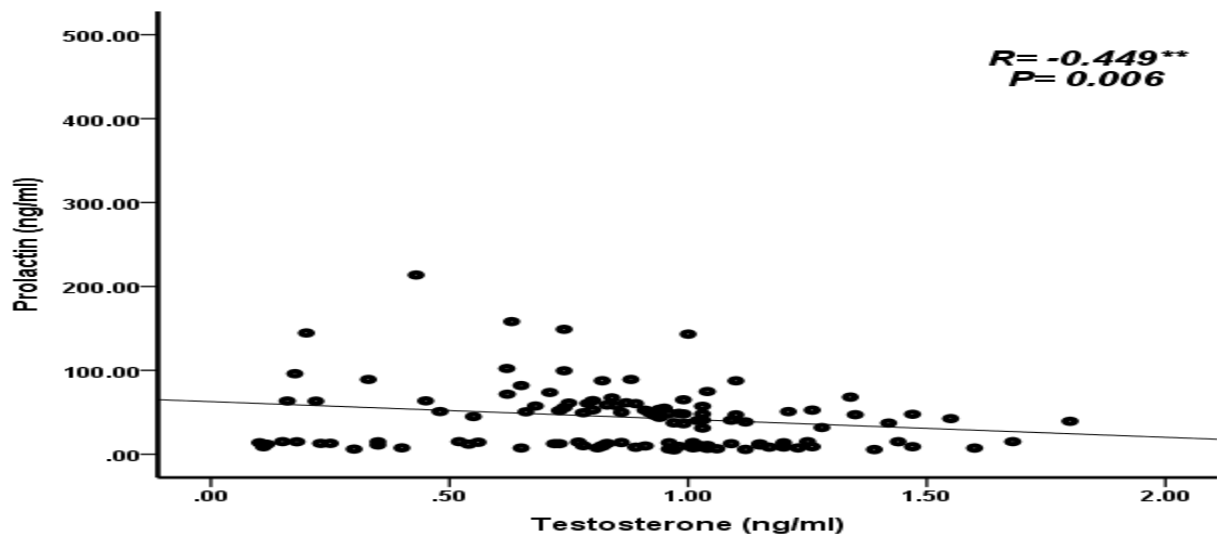
Figure (4) correlation between prolactin level and testosterone level (r=-0.449 p,value =0.006) , there was significant moderate negative correlation.

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 Khartoum State, Sudan, there is an obvious problem of male infertility. The results of this study showed significant increase in the mean of plasma level of prolactin hormone among participants. This result agreed with another result done by Syed [8] which reported that; PRL was elevated in patients with normal count of sperm but infertile and we find that PRL is elevated among those infertile males. Also the result in agreement with another result carried by Carter [9] reported that, Prolactin-secreting pituitary adenoma, which was 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. Hyperprolactinemia cause infertility in around 11% of oligospermicmales[8]. Also the result is similar to another result which found that, hyperprolactinemia produce secondary hypogonadism and infertility.[10] Another result reported that; prolactin was significantly increased in Sudanese men with varicocele[7] , that findings were in contrary with Cuneyt *et al* [11] . Hyperprolactinemia is associated with hypogonadism in men. On the other hand hyperprolactinemia may be due toprolactin secreting tumors or macroprolactinemia as reported in Turkey by Celal *et al* [12]

prolactin has also been reported to play a role in the synthesis of testosterone through upregulation of LH receptors on Leydig cells but the relevance of this mechanism to reproductive physiology has not been understood [13] Testosterone is known to be involved in the feedback inhibition of LH, the hormone responsible for its synthesis in the testis . By analogy, it is again tempting to assume that a similar mechanism of feedback inhibition by testosterone could also exist for prolactin. Such a mechanism could conceivably be playing a vital role in male reproductive physiology by modulating prolactin and testosterone levels in systemic circulation under conditions of mild-to-moderate hyperprolactinemia arising out of emotional or chemical stress. [14]

 Results of this study found , there was no correlation between Prolactin level and age (r= o.151 , p, value = 0.099) while there was significant moderate negative correlation between testosterone level and age(r=-0.323 , p, value= 0.014). This result agreed with another result which found that, the

prevalence of biochemical testosterone deficiency increases with age. This is partly due to decreasing testosterone levels associated with illness or debility but there is also convincing epidemiological data to show that serum free and total testosterone levels also fall with normal aging.[15] also there was significant moderate negative correlation between testosterone level and Prolactin level (r=-0.449 , p, value = 0.006).

Acknowledgment

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