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Research Article

Hormonal Evaluation in Infertile Males of Aurangabad District, India

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Abstract

Background: Infertility is defined as inability to achieve conception in a period of one year in a couple, despite regular and adequate unprotected sexual intercourse. The failure of pituitary to secret LH and FSH will result in disruption of testicular function leading to infertility.

Aim: The present study was aimed to determine the levels of LH, FSH and testosterone in infertile males.

Methods: The study included 60 subjects of age group 25-40 years, out of which 30 were cases of infertile males and rest 30 were healthy fertile males of same age group (Control group).

Result: Our study showed significant increase ($p<0.001$) in the levels of serum LH and FSH in infertile males as compared to control group where as there was significant decrease ($p<0.001$) in the level of serum Testosterone in infertile males as compared to control group.

Conclusion: Our study concludes that evaluation of LH, FSH and testosterone in serum play important role in the diagnosis and management of male infertility.

Keywords: Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), Male infertility, Testosterone

Introduction

When a couple fails to conceive even after two years of regular frequent coitus and there is no known reproductive pathology, the couple may be considered infertile [1]. Those couples who do not conceive in more than one year should be regarded as sub-fertile. According to this definition, approximately 14% of the couples are sub-fertile. To be more exact, the term sub-fertile means a male who failed to conceive after one year of regular unprotected intercourse with the same partner and had a sperm count of less than 20 million/ml [2]. Infertility has increased as a problem over the last thirty years all over the world, regarding to social phenomena, such as the tendency for marriage at a later age and child bearing, increasing use of contraception specially intrauterine device and liberalized abortion [3].

The incidence of infertility in a population has important demographic and health implications [3]. The prevalence of infertility varies widely, being less in developed countries and more in developing countries where limited resources for investigation and treatment are available [4]. Infertility is an important medical and social problem in the world as regards 15% of couples are infertile and 40% are infertile because of male factor infertility and 40% are because of female factor infertility and in the remainder cases both factors are associated [5].

Fertility in males require normal functioning of hypothalamus, pituitary glands and testes and balanced endocrine secretion of these glands are required for development of complete male germ cells [6]. The Gonadotropins-Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) are secreted from ante-

rior pituitary in response to Gonadotropin Releasing Hormones (GnRH). Gonadotropin releasing hormones secreted from the medial basal hypothalamus. The levels of these hormones are under negative feedback control of gonads. The primary role of theses hormones is to stimulate the production of testosterone by the ley dig cells and to regulate spermatogenesis in sertoli cells in males. The failure of pituitary to secrete Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) will result in disruption of testicular function leading to infertility [7]. Therefore, hormones measurement can help to find out the cause of male infertility. To our knowledge, there is no available study about hormonal evaluation in infertile males with special reference to Aurangabad District. Hence, the present study was aimed to investigate the levels of LH, FSH and testosterone in infertile males of Aurangabad District.

Materials and Methods

The present study was carried out in the Department of Biochemistry and Central Investigation Laboratory in collaboration with the department of Obstetrics and Gynaecology and In-vitro Fertilization (IVF) centre at Tertiary Care Hospital, Aurangabad. The study was approved by Institutional Ethical and Research Committee to use human subjects in the research study. Informed consent was taken from patient and control subjects. The duration of study was one year. The male infertile patients and healthy fertile controls voluntarily participated in the study.

Subjects: A total 60 subjects were selected for the present study based on inclusion and exclusion criteria. Out of 60 subjects, 30 were infertile male patients and 30 were age matched healthy fertile controls.

Inclusion Criteria: Cases: The study includes thirty male infertile patients of age group 25-40 years, referred by various Infertility Centres to Tertiary Care Hospital, Aurangabad. The infertile patients have not conceived after one year of regular, unprotected intercourse and had an abnormal semen analysis.

Controls: Thirty normal healthy fertile male subjects of same age group without any major illness belonging to the same socio-economic status with normal semen parameters were considered as controls.

Exclusion Criteria: Cases of Sexually Transmitted Diseases (STDs), Diabetes Mellitus, Cardiac Diseases, Renal Diseases, Hepatic Diseases and Prolonged illness were excluded from the study.

Collection of Blood Sample: About 5 ml of venous blood from all subjects was collected in clean, disposable plastic tubes aseptically from anterior anti cubital vein. It was allowed to clot for few minutes and was subjected to centrifugation for 10 minutes at 3000 rpm to separate the serum and kept at 20^0 C until analysis was carried out.

Collection and processing of semen: Semen samples were collected from the patient and control groups. All specimens were collected into sterile plastic containers by masturbation after an abstinence period of 72-96 hours and analyzed within one hour of collection. After allowing at least 30 minute for liquefaction to occur, semen analysis was performed to measure sperm concentration, percentage progressively motile sperms and normal sperm morphology in accordance with the recommendations of the WHO (1999) [8]. Sperm concentration was determined by diluting a semen sample in a semen diluting fluid. Thereafter, some quantity of diluted sample transferred to Neubauer chamber and sperm count was determined under the microscope. Sperm motility was expressed as the spermatozoa that showed forward progression.

Parameters Measured : The following parameters were estimated in the present study-

1. Serum Luteinizing Hormone (LH)
2. Serum Follicle Stimulating Hormone (FSH)
3. Serum Testosterone

The serum LH, FSH and Testosterone were analyzed by using diagnostic kits from Siemens Company on IMMULITE 1000.

Statistical analysis

Results were statistically analyzed by "Graphpad QuickCals". Student's t-test was used to assess the significance of difference between the groups. All results are presented as mean ± S.D. A 'p' value of less than 0.05 was considered significant.

Observation and Results

Group	Number of subjects studied	Age (Years) (Mean ± SD)	'p'-value
Controls	n=30	31.57 ± 5.18	>0.05 NS
Cases	n=30	30.93 ± 5.44	
NS= Statistically Insignificant			

Table 1: Showing mean age of Cases and Controls.

As shown in Table No. 1, mean age (mean ± SD) of controls and cases were 31.57 ± 5.18 years and 30.93 ± 5.44 years respectively. It was verified that these mean ages among cases and controls were not statistically significant (p>0.05).

Group	Number of Subjects Studied	LH (mIU/ml)	FSH (mIU/ml)	Testosterone (ng/dl)
		(Mean ± SD)	(Mean ± SD)	(Mean ± SD)
Controls	n=30	4.16 ± 1.85	4.36 ± 2.47	422.40 ± 198.26
Cases	n=30	8.03 ± 4.20	11.27 ± 11.03	245.81 ± 138.37
'p' value		<0.001S	<0.001S	<0.001S
S=Statistically Significant, LH= Luteinizing Hormone, FSH= Follicle Stimulating Hormone				

As shown in Table No. 2, the mean serum level of LH in cases and controls were 8.03 ± 4.20 and 4.16 ± 1.85. The statistical analysis by unpaired t-test showed that there was significant increase in serum LH level in cases compared to controls ($p<0.001$). Similarly the mean serum level of FSH in cases and controls were 11.27 ± 11.03 and 4.36 ± 2.47. The level of FSH is increased in cases compared to controls and was statistically significant ($p<0.001$). However, the mean serum level of testosterone was significantly decreased in cases (245.81 ± 138.37) compared to controls (422.40 ± 198.26).

Discussion

Male infertility depends upon an intact hypothalamo-pituitary testicular axis to initiate and maintain quantitatively and qualitatively normal spermatogenesis, maintain normal secondary sex glands functions and sexual functions [6]. It is extremely important in the evaluation of male infertility to consider the reproductive hormone levels [7]. It was reported that FSH, LH and testosterone have major role in male spermatogenesis [9]. FSH, LH and testosterone are prime regulators of germ cell development. The quantitative production of spermatozoa generally requires the presence of FSH, LH and Testosterone. FSH acts directly on the seminiferous tubules, whereas Luteinizing hormone stimulates spermatogenesis indirectly via testosterone. FSH plays a key role in stimulating mitotic and meiotic DNA synthesis in spermatogonia [10].

In the present study, there was significant increase in serum LH and FSH levels in cases compared to controls ($p<0.001$). These results are in accordance with previous studies, [10-12] who showed both lutenizing hormone and follicle stimulating hormone levels were significantly elevated in infertile males when compared with the levels in proven fertile controls. In the present study, we found significant decrease in serum testosterone level in cases compared to controls ($p<0.001$). This result is in agreement with previous studies [11,13] who showed significant decrease in serum testosterone level in infertile males compared to controls. Elevation of FSH and LH was reported to be an indication of testicular failure in which there is loss of negative feedback by testicular products which lead to increase in the levels of FSH and LH causing in failure of sperm production [7]. The overall results of the present study clearly indicate significant increase in gonadotropins (FSH and LH) in infertile males as compared to controls where as significant decrease in testosterone in infertile males as compared to fertile control group. The increase in the levels of LH and FSH might have disrupted the process of spermatogenesis, leading to the decline in the count of sperm and infertility.

Conclusion

In our study, we found significant increase in the levels of LH, FSH and significant decrease in the level of testosterone in infertile males. As there occurs alteration in the levels of LH, FSH and testosterone in infertile males, evaluation of LH, FSH and testosterone in serum play important role in the diagnosis and management of male infertility.

The limitation of the present study was that the research had conducted on small size sample. So, further studies with adequate sample size are necessary to finally accept the concept.

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