Role of Oestrogen and Testosterone in Male Infertility

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Abstract

Introduction: About 15% of couples are infertile. This suggests they can't think about a child, in spite of the way that they've had visit, unprotected sex for a year or more. In over 33% of these couples, male barrenness accept a role. Male infertility is a direct result of low sperm creation, unusual sperm limit or blockages that forestall the movement of sperm. Afflictions, wounds, interminable clinical issues, lifestyle choices and various parts can expect a job in causing male barrenness. Testosterone and Estrogen have been viewed as male and female sex hormones, separately. However, estradiol, the dominating type of Estrogen, likewise assumes a critical role in male sexual capacity. Estradiol in men is fundamental for modulating libido, erectile capacity, and spermatogenesis.

Aim: Role of Eestrogen and Teststerone in Male Infertility.

Material and Method: The present study includes total 60 subjects that include 30 infertile male and 30 fertile male. Blood samples collected from the subjects were obtained for serum estrogen and testosterone estimation, from OPD, general medicine and OBGY wards.

Result: As we found the level of oestrogen in infertile male was 19±1.2 as compared to fertile male 37.1±2.7pg/ml that is statistically highly significant. The degree of testosterone in infertile male was 4.94±0.98 while in fertile male it was 5.01±1.31 and it is statistically non-significant.

Conclusion: concentrations of serum estradiol in infertile patients are reduced significantly. It remains to be explained why estradiol decreased. Based on our results, however, there is little benefit to be gained from routine estradiol measurement as part of investigating men who complain about infertility. Low testosterone does not cause stomach discomfort. In fact, sperm production is stimulated by hormones other than testosterone.

Keywords: *Infertility, oestrogen, Testosterone, estradiol, gametogenesis.*

Introduction

Human male barrenness is the significant medical issue around the world. In most recent ten years there has been colossal logical development in the field of reproductive medication. Its prevalence in Western nations has been assessed with 20%. According to WHO study, rate of barrenness in India is 10 to 15%. In 15% barren couples, about 30% cases are because of

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guys only and in another 20% the two accomplices have perceptible variations from the norm. Subsequently a male factor assumes a huge job in about half of infertile couples.(1)

Infertility is characterized as inability to conceive following one year of standard unprotected intercourse with a similar accomplice. Barrenness has been credited to number of elements, for example, anatomic imperfections, endocrinopathies, immunologic issues, gene mutation, radiation presentation, chemotherapy, ejaculatory disappointments and ecological exposures. Causes cannot be found in over 25% of infertile guys, and these cases are alluded to as idiopathic infertility.(2)

Hypogonadism characterized as lacking gonadal capacity showed by insufficiencies in gametogenesis or hormone discharge, is a typical clinical condition influencing men's fertility and sexual health.In the United States, practically 39% of men beyond 45 years old were found to have low serum testosterone (T) levels. (3)

Estrogen is viewed as the 'female' hormone, while testosterone is considered the 'male' hormone. In any case, the two hormones are available in both genders.(4) Estradiol in men is basic for regulating libido, erectile capacity, and spermatogenesis. Estrogen receptors, just as aromatase, the enzyme that changes over testosterone to Estrogen, are inexhaustible in mind, penis, and testis, organs significant for sexual capacity. In the cerebrum, estradiol union is expanded in regions identified with sexual excitement.(5)

Testosterone production is central to the spermatogenesis. Typical levels of intratesticular testosterone are 50 to several times the testosterone concentration present in serum. Interference with this important amount of intratesticular testosterone is one reason why exogenous testosterone can either weaken or close spermatogenesis altogether extraordinarily. Similarly, hypogonadal endogenous states may be a cause for impaired spermatogenesis, and patients with hypogonadism that give oligozoospermia or azoospermia.(6)

Estradiol effect at low testosterone levels: To discern the effect of estradiol, it is important to evaluate its effect on libido at both low and normal levels of circulating testosterone. Decreased testosterone is clearly associated with low libido in males.(7) In men with diminished testosterone, the administration of exogenous estradiol has been shown to increase libido.(8)

Estradiol (E2) levels have not been concentrated broadly in infertile guys. There is proof that plasma concentration of E2 in a group of infertile men with azoospermia because of seminiferous tubule harm was essentially higher than men with obstructive azoospermia.(9)

Association between Estradiol and Erectile Function: Erectile capacity is multifaceted with an important blend of nerve, vessel, and endocrine activities that cooperate to deliver resulting penile basic changes in a planned manner. Smooth muscle, endothelium, and cell-to-cell interchanges by means of hole intersections are fundamental to erectile capacity, and accordingly pathology in any of these can prompt ED. The pathophysiology and clinical job of testosterone in erectile capacity have been concentrated widely. Androgens are vital for the penis to develop and create, and furthermore add to the physiology of erections. (10)

Testosterone is a pleiotropic hormone that assumes numerous physiological functions in, and during, the formation of male genitalia in utero. Classically, testosterone is a masculinity-related hormone. Testosterone is used as a therapy for males with late onset hypogonadism, a disease in men with symptoms triggered by a drop in serum testosterone. Low testosterone related symptoms can include reduced libido, diminished muscle mass, depression and/or erectile dysfunction.(11)

Testosterone development in normal healthy men is strictly controlled by the axis of the HPG. Higher cortical centers throughout the brain signal the hypothalamus in a pulsatile manner to secrete the GnRH. GnRH in turn stimulates the release by the Sertoli cells of LH and FSH from the anterior pituitary which modulates the development of testosterone from the Leydig cells and spermatogenesis, respectively. As the levels of testosterone increase, negative feedback suppression is introduced to the androgen receptors in the hypothalamic neurons and pituitary gland, thereby inhibiting the release of GnRH, FSH and LH.(12)

Material and Method

Study Area: The study was conducted in the Department of Biochemistry and Department of Medicine at Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, Hingana Nagpur

in collaboration with Jawaharlal Nehru Medical College & AVBRH (Datta Meghe Institute of Medical sciences) Sawangi (Meghe) Wardha, Maharashtra.

Study Population:

Group I: 30 infertile male.

Group II: 30 fertile male

Patients Selection: Total 60 subjects were enrolled and were grouped as mentioned ahead.

Study Type: A cross-sectional study

Sample Collection: All experiments were performed from 8:30 to 9: OO a.m. in an ambulatory environment. 5ml venous blood will be collected under strict aseptic conditions in plain bulb for serum. Serum will be used for estimation of Oestrogen and testosterone.

Biochemical Analysis: Serum Oestrogen were analyzed by radioimmunoassay (RIA)[13] Serum Testosterone were analyzed by T RIA method.[14]

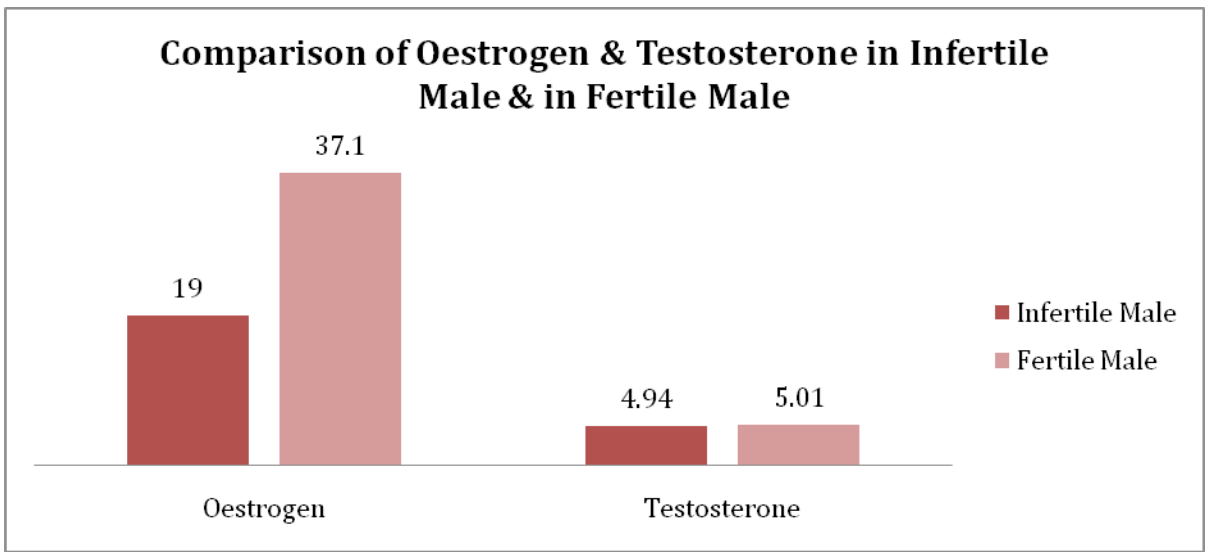
Statistical Analysis: Data collected was entered into Microsoft Excel Worksheet and statistically analysed by using SPSS (Statistical Package for Social Sciences) version 20. For quantitative data mean, standard mean, standard deviation, t-test and Karl Pearson's Coefficient of Correlation were calculated. P value < 0.05 (0.01) will be considered as statically significant (highly significant) at 95% confidence interval.

Result

Table 1: Comparison of Oestrogen & Testosterone in Infertile Male & in Fertile Male

Parameters	Infertile Male	Fertile Male	P-Value
Oestrogen	19±1.2	37.1±2.7	P < 0.0001
Testosterone	4.94±0.98	5.01±1.31	0.8155

Table shows the mean value of oestrogen and testosterone in infertile male and fertile male. As we found the level of oestrogen in infertile male was 19±1.2 as compared to fertile male 37.1±2.7pg/ml that is statistically highly significant. The degree of testosterone in infertile male was 4.94±0.98 while in fertile male it was 5.01±1.31 and it is statistically non-significant.



Graph 1: Shows the Comparison of Oestrogen & Testosterone in Infertile Male & in Fertile Male

Discussion

Roughly 15% of couples have barrenness, however just 1 of every 5 of these couples look for assessment and treatment.[15] In 30% of infertile couples, a noteworthy male factor alone is found as the reason for infertility. An extra 20% of couples have both male and female elements; in this way, male elements add to one-portion of every single non-fertile relationship.[16]

The mean serum oestrogen rates in infertile males were significantly reduced in the present study as opposed to fertile males, and our research was confirmed by Masanori Yamamoto et al.(1995) showed that serum estradiol concentrations in azoospermic or oligozoospermic patients were significantly reduced than those in normozoospermic men.[17] Hargreave et al. verified that infertile men had low estradiol level in azoospermic or oligozoospermic patients. [18]

In the present study the difference in the mean serum testosterone levels between fertile and infertile men were insignificant. Similar observations were made by Subhan et al.[19] Smith et al.[20], Rege N.A et al.[21] and S. Ramesh Babu et al.[22]

The testosterone levels were found to be common in infertile men with Sertolicell only syndrome. S. Ramesh Babu et al.[22] studies documented normal testosterone levels with Sertoli-cell only syndrome in infertile people.

Conclusion

In general, concentrations of serum estradiol in infertile patients are reduced significantly. It remains to be explained why estradiol decreased. Based on our results, however, there is little benefit to be gained from routine estradiol measurement as part of investigating men who complain about infertility. Low testosterone does not cause stomach discomfort. In fact, sperm production is stimulated by hormones other than testosterone. Testosterone is needed for sperm production, but there are several times higher levels in the testes where sperm is produced than in the blood. Even men with low or borderline T levels may have enough T levels to produce sperm.

Ethical Clearance: Taken from institutional ethics committee.

Source of Funding: Self.

Conflict of Interest: Nil.

References

1. Badade Z, More K, Narshetty J. Oxidative stress adversely affects spermatogenesis in male infertility. Biomedical Research, 2011; 22 (3): 323-328.
2. Campbell A, Irvine D. Male infertility and intracyto-plasmic sperm injection (ICSI). Br Med Bull 2000; 56: 616-629.
3. Majzoub A et al. Testosterone replacement in the infertile man, Translational Andrology and Urology. 2016;5(6):
4. Hess R et al. A role for oOestrogens in the male reproductive system, Nature. 1997; 390(6659): 509–512. doi:10.1038/37352.
5. Schulster M et al. The role of estradiol in male reproductive function. Asian J Androl. 2016; 18(3): 435–440.
6. Coviello, A et al, Low-dose human chorionic gonadotropin maintains intra testicular testosterone in normal men with testosterone-induced gonadotropin suppression. J Clin Endocrinol Metab. 2005;90:2595–2602
7. Travison T et al. The relationship between libido and testosterone levels in aging men. J Clin Endocrinol Metab. 2006;91:2509–13.
8. Wibowo E, Schellhammer P, Wassersug R. Role of Oestrogen in normal male function: clinical implications for patients with prostate cancer on androgen deprivation therapy. J Urol. 2011;185:17–23.
9. Hargreave T. Estradiol and male fertility, Fertility and Sterility. 1988;49(5):871-875.
10. Schulster M et al. The. role of estradiol in male reproductive function, Ranjith Ramasamy,Asian Journal of Andrology (2016) 18, 435–440.
11. Patel A et al. Testosterone Is a Contraceptive and Should Not Be Used in Men Who Desire Fertility, World J Mens Health 2019 January 37(1): 45-54
12. Basaria S. Male hypogonadism. Lancet 2014;383:1250-63.
13. Verdonck L et al. Comparison of quick methods for the estimation of estradiol in plasma by radioimmunoassay Journal of Steroid Biochemistry, 1974;5(5):471-479
14. Wang C et al. Measurement of Total Serum Testosterone in Adult Men: Comparison of Current Laboratory Method Versus Liquid

Chromatography-Tandem Mass Spectrometry. The Journal of Clinical Endocrinology & Metabolism 89(2):534–543

15. Ohlander S et al. Testosterone and Male Infertility. UrolClin N Am 2016;43:195–202.
16. Sigman, M., Jarow P. Endocrine evaluation of infertile men. Urology. 1997;50:659–664
17. Yamamoto M et al. SERUM Estradiol levels in normal men and men with idiopathic infertility. Int J Urol 1995;2:44-46
18. Hargreave T et al. Estradiol and male infertility. Fertil Steril 1988;49:87 1-875
19. Subhan F et al. Oligospermia and its relation with hormonal profile. Pak. Med. Assoc. 45 (9), 246-247
20. Smith S. et al. Plasma concentrations of pituitary and testicular hormones of fertile and infertile men. Clin.Reprod. Fertil. 3 (1), 37-48.
21. Rege N et al. Serum gonodotropins and testosterone in infertile patients with varicocele. Fertil. Steril. 31(4),413- 416.
22. Babu S et al. Evaluation of FSH, LH and Testosterone Levels in Different Subgroups of Infertile Males, Indian Journal of Clinical Biochemistry, 2004, 19 (1) 45-49.