MATHEWS

Research Article

Mathews Journal of Case Reports

Semen Profile Quality and Serum Hormonal Profile Relationship Among Infertile Men Attending General Hospital Awo Omamma, Imo State

Treasure Njoku-Obi[1], Johnkennedy Nnodim[2,*], Chinyere Osuoha[3], Promise Nnodim Amarachi[2]

[1]*Department of Microbiology, Faculty of Sciences, Imo State University Owerri, Imo State, Nigeria*

[2]*Department of Medical Laboratory Science, Faculty of Health Science, Imo State University Owerri, Nigeria*

[3]*Department of Laboratory Services, General Hospital Awo Omamma, Imo State, Nigeria*

ABSTRACT

Semen profile and hormone profile are important parameters in giving a good diagnosis in male infertility. dysfunction of hormone production has been noted as a causative factor in male. This study was carried out to determine the semen profile including semen count, motility, volume, viscosity as well as morphology of semen and the hormone profile including Testosterone, Follicular stimulating hormone (FSH)) and Prolactin (PRL)) among infertile Awo Omamma males in Imo State. A total of 100 fertility dysfunction men were recruited to participate in this study. Semen sample was collected from each participant either by masturbation or coitus interruptus in a sterile container. One hundred venous bloods were collected under aseptic condition into heparinized container for hormonal profile analysis. The (FSH), Testosterone, Follicular stimulating hormone (FSH)) and PRL levels were measured quantitatively for each sample using automated immunoassay analyzer. The serum level of FSH (37.53±4.81ng/ml) and prolactin (453.71±34.18ng/ml) in infertile men were significantly increased when compared to non-infertile men (8.32±4.88ng/ml and 84.10±23.74ng/ml) respectively at $P < 0.05$. The serum level of Testosterone (6.92±2.90 ng/ml) was significantly decreased in infertile men when compared with control (9.01±3.11ng/ml) ($P < 0.05$). The hormone profile levels (FSH, Prolactin and testosterone) were within the normal reference value among the group of secondary fertility and fertility checkup males. Hormonal evaluation must be done as part of the routine diagnosis of male infertility as their levels were dependent on quality of semen profile.

Keywords: Hormonal Tests, Semen Profile, Infertility, Awo Omamma, Imo State.

INTRODUCTION

Deficits in sperm production, concentration, or transit can cause infertility in males. This broad divide aids in defining a treatment plan and permits a suitable workup of possible underlying causes of infertility [1]. Male infertility issues are often diagnosed by a general physical examination and medical history. Examining the genitalia and getting information about any hereditary disorders, long-term health issues,

Vol No: 09, Issue: 10

Received Date: November 21, 2024

Published Date: December 20, 2024

***Corresponding Author**

Johnkennedy Nnodim

Department of Medical Laboratory Science, Faculty of Health Science, Imo State University Owerri, Nigeria, Phone: 08181366290, Email: johnkennedy23@yahoo.com

Citation: Njoku-Obi T, et al. (2024). Semen Profile Quality and Serum Hormonal Profile Relationship Among Infertile Men Attending General Hospital Awo Omamma, Imo State. Mathews J Case Rep. 9(10):193.

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diseases, traumas, or procedures that can have an impact on fertility are all part of this process. The doctor may also inquire about sexual preferences and the development of the sex during puberty. Additionally, there are two ways to collect semen samples in the lab: masturbating and ejaculating into a designated container.

Some guys prefer a different approach of gathering semen because of their cultural or religious convictions. In certain situations, a special condom might be used during sexual activity to collect semen [2].

After that, the semen is sent to a lab to count the amount of sperm and check for any anomalies in the morphology (or shape) and motility (or movement) of the sperm. Additionally, the lab will look for any indications of issues like infections in the semen [3].

Sperm counts frequently differ noticeably between specimens. To guarantee accurate results, many semen analysis tests are typically performed over time. Before doing any more tests for male infertility, the doctor will probably advise comprehensive testing of the female partner if the results of the sperm analysis are normal [4].

To help determine the reason behind the infertility, the doctor may suggest doing more testing. These may consist of ultrasonography of the scrotum. This test creates images inside your body using high-frequency sound waves. A varicocele or other issues with the testicles and supporting tissues can be seen by the doctor with the aid of a scrotal ultrasound. While transverse ultrasound is very important tool as in the rectum, a tiny, lubricated wand is inserted. It enables the doctor to examine the prostate and search for semen-carrying tube obstructions [5].

Also, the pituitary, brain, and testicles all create hormones that are important for sperm generation and sexual development. Other hormonal or organ system abnormalities may also play a role in infertility. Tests on the blood are used to determine hormone levels, including testosterone.

The Retrograde ejaculation, or the presence of sperm in the urine, is a sign that the sperm are going through the bladder rather than the penis during ejaculation. There may be a hereditary explanation for very low sperm concentrations. If there are any minute alterations in the Y chromosome, which could indicate a genetic disorder, a blood test can detect them. A variety of congenital or hereditary syndromes may require genetic testing to be diagnosed. Using a needle, samples are taken from the testicle for this examination. If the testicular biopsy results indicate that sperm production is normal, then your issue is probably the result of a blockage or another issue with sperm transport [6,7].

To determine whether sperm have any issues adhering to the egg, how well they enter an egg, and how long they live following ejaculation, a variety of tests can be performed. These tests are rarely performed and typically have little effect on therapy recommendations [8].

Chemicals known as hormones are released into our bloodstream by the endocrine system. The body's homeostatic processes are carried out by individual glands that make up the endocrine system. The pituitary gland stimulates the growth of bones and tissues throughout puberty and signals the body that it is ready for adulthood. The glands that secrete the hormones necessary for the body to function include the pituitary, pineal, adrenal, thymus, thyroid, pancreas, ovaries, and testes. Serious problems may arise from the malfunctioning of some of these glands. Hormones can lead to a number of significant and emotionally exhausting conditions in the body, such as diabetes, hyperthyroidism, and even infertility [9].

Three main hormones, each with a specific function, control the male reproductive system: Follicle-stimulating hormone (FSH): spermatogenesis depends on FSH. It stimulates the generation of sperm cells by acting on the Sertoli cells in the testes. Luteinizing hormone (LH): LH causes the testes' Leydig cells to create more testosterone, the primary androgen in charge of a number of male bodily processes. The hormone testosterone has two functions. In addition to supporting spermatogenesis, it is in charge of the development and upkeep of secondary sexual traits in males, including desire, body hair, deeper voice, and greater muscle mass [4].

To keep the male reproductive system in balance, these hormones work together in a feedback loop controlled by the pituitary and hypothalamus. In female reproduction, hormones are essential, especially those that regulate the menstrual cycle. Hormones in the body must communicate with and control the development of an egg inside an ovary, the release of the newly developed egg into the fallopian tube, and the thickening of the uterine lining in preparation for implantation for a pregnancy to transpire. In the event that sperm fertilizes the freshly released egg, the resultant embryo will proceed to the uterus for implantation [10].

Any of the aforementioned processes may be delayed or prevented by an imbalance in the amount of one or more hormones, which can make getting pregnant challenging. Male factors account for almost half of all occurrences of infertility, a serious health issue that impacts people, families, and communities. Infertility in men is frequently associated with hormonal imbalances and abnormalities in the quality of the semen, such as decreased sperm count, motility, or morphology. For diagnosis and treatment to be successful, it is crucial to comprehend the connection between serum hormonal profiles and semen quality.

MATERIALS AND METHODS

This is cross sectional analytical study was conducted during the period from May 2018 to November 2019 to assess the fertility hormone profile Follicular stimulating hormone (FSH), Testosterone and Prolactine (PRL) among infertile males attending Andrology Clinic at Reproductive Health Care Centers of Awomamma General Hospital Imo State. Ethical clearance was obtained from the ethical committee of the General Hospital Awo Omamma. In addition, personal consent was obtained from each. A total of 100 individuals (50 infertile and 50 fertility checkup men) were recruited to participate in this study. After accepting to participate in the study each candidate was given clear written and spoken instructions concerning the collection of the semen sample. These emphasized that semen sample needs to be complete and loss of any fraction of the sample reported. The man passed urine, washed hands and penis with soap, to reduce the risk of contamination. The specimen was collected after 3–5 days of abstinence by masturbation or coitus interruptus into sterile wide mouth container. The following information were recorded on the request form: Name, age, code number, the period of abstinence, the date and time of collection, the completeness of the sample, any difficulties in producing the sample and the time of collection. A private room near the laboratory was availed for collection of semen, in order to limit the exposure of semen to fluctuations in temperature and to control time between collection and analysis. All the seminal fluid specimens (100) were processed under aseptic conditions. The volume of seminal fluid was measured by decanting whole sample into a graduated centrifuge tube and the volume recorded in ml±0.1. Microscopic study of sperm count and motility were determining by adding 10 µg of liquefied semen using Computer-aided sperm analysis (CASA) based on WHO criteria. One hundred venous blood samples were collected under aseptic condition into heparinized container. After centrifugation (5,000 rpm) for 5min., the plasma was separated from packed cells and 50µl was used for hormonal analysis. The Follicular stimulating hormone (FSH), Prolactin (PRL) and serum Testosterone levels were investigated for each sample using automated immunoassay analyzer.

The normal reference values for FSH: 2.7–18.6 ng/ml, Testosterone: 9.0–30.16 ng/ml and Prolactin: 97.2–440.1 ng/ml

Statistical Analysis

The values were expressed as mean ± standard deviation. The student t-test was used to calculate the significant differences at $P<0.05$.

RESULTS

Table 1. The serum levels of Follicular stimulating hormone (FSH), Prolactin (PRL) and testosterone in infertile men compared with non-infertile male

Parameters	Fertile Male	Infertile Male
Follicular stimulating hormone (ng/ml)	37.53±4.81	8.32±4.88*
Prolactin(ng/ml)	9.55±4.18	4.10±2.74*
Testosterone (ng/ml)	9.01±3.11	6.92±2.90*

*significantly decreased in infertile male compared with fertile male at $p<0.05$.

DISCUSSION

The findings in this study provide light on the hormonal profiles of men who are fertile versus those who are not, with a particular emphasis on levels of testosterone, prolactin, and follicular stimulating hormone (FSH). For male fertility and maximum semen quality, these hormones must remain in balance. The underlying causes of infertility can be diagnosed with the help of observable anomalies in semen, which are frequently caused by hormonal disruptions

Guys who are fertile have a mean blood level of FSH that is much greater (37.53 ± 4.81 ng/ml) than infertile guys (8.32 ± 4.88 ng/ml), and this difference is statistically significant ($p < 0.05$). Spermatogenesis is regulated in large part by FSH. Men who are fertile may have elevated levels, which could signify healthy testicles and efficient spermatogenesis [11]. On the other hand, male infertiles' noticeably reduced FSH levels point to probable problems with the hypothalamic-pituitary-gonadal axis or disturbances in spermatogenesis. By reducing sperm production, this FSH decrease may be a factor in infertility. Each hormone's unique impacts on the quality of semen stem from its functions in controlling spermatogenesis and other facets of male reproductive physiology. The seminiferous tubules' Sertoli cells are directly stimulated by FSH to support the growth of sperm cells. increases the number of sperm by encouraging the growth and development of germ cells. It ensures that sperm cells are properly nourished and mature, which indirectly

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Reduced sperm count (oligospermia) or no sperm at all in semen (azoospermia) are two outcomes of low FSH levels [12].

There is a significant difference in prolactin levels between the two groups as well; males who are fertile have mean levels of 9.55 ± 4.18 ng/ml, whereas infertile males have mean levels of 4.10 ± 2.74 ng/ml ($p < 0.05$). An imbalance in prolactin can affect spermatogenesis and testosterone levels, which is relevant to reproductive health [13]. Although further research is needed to determine the precise causes, the reduced prolactin levels seen in male infertiles may indicate a hormonal imbalance impacting reproductive function. Prolactin and testosterone cooperate to control spermatogenesis. Moderate amounts promote libido and sperm production.The hypothalamic-pituitary-gonadal axis can be upset by either hyperprolactinemia (high prolactin) or hypoprolactinemia, which lowers testosterone levels and degrades semen quality [14].

There is a statistically significant difference ($p < 0.05$) in the levels of testosterone in fertile males (9.01 ± 3.11 ng/ml) as opposed to infertile guys (6.92 ± 2.90 ng/ml). The development of sperm cells in the seminiferous tubules depends on testosterone, which is produced by Leydig cells. It sustains the full growth of functional sperm and keeps the sperm count stable. It affects sperm motility by maintaining healthy epididymal activity, which causes sperm to become motile. Indirectly contributes to sperm viability by altering the composition of seminal fluid. In fact, hypogonadism, or low testosterone, can result in aberrant morphology, poor motility, and a decreased sperm count. The growth and upkeep of male reproductive tissues, including the creation of sperm, depend on testosterone [15]. Male infertility may be linked to hormonal imbalances or poor testicular function, as lower testosterone levels are frequently linked to decreased fertility [16,17].

CONCLUSION

In general, male infertiles have considerably lower amounts of FSH, Prolactin, and Testosterone in their hormonal profiles than do their fertile counterparts. These variations imply that infertility is probably caused by hormonal abnormalities. Particularly low levels of FSH and testosterone may indicate problems with spermatogenesis and reproductive health. To fully understand the underlying causes of these hormone anomalies and how precisely they contribute to male infertility, more diagnostic research is necessary.

REFERENCES

1. Mansour R, Ghanem M. (2020). The role of endocrine disorders in male infertility: An update. Current Opinion in Endocrine and Metabolic Research. 13:31-36.
2. Ramasamy R, Carpi A. (2022). Endocrine evaluation in the male infertility workup. Urology Clinics of North America. 49(3):349-360.
3. Santi D, Ray M. (2023). Hormonal factors and their effects on male semen quality: A review. Andrologia. 55(1):e14236.
4. Davis SR, Bowers HL. (2019). Hormonal assessment in male infertility: Diagnostic and therapeutic approaches. Clinical Endocrinology. 90(3):341-351.
5. Sikka SC, Hellstrom WJG. (2016). Curren Updates on Laboratory Techniques for the Diagnosis of Male Reproductive Failure. Asian J Androl. 18(3):392-401.
6. Kumar N, Singh AK. (2021). Male infertility: Causes and management. Journal of Assisted Reproduction and Genetics. 38(5):1234-1243.
7. Abarikwu SO. (2013). Causes and risk factors for male-factor infertility in Nigeria: a review. Afr J Reprod Health. 17(4):150-166.
8. World Health Organization (WHO). (2021). WHO laboratory manual for the examination and processing of human semen (6th ed.). World Health Organization. Available at: https://www.who.int/publications/i/item/9789240062060
9. Nwokoye IC, Ogbu AC. (2023). The role of prolactin and testosterone in male infertility: A review of recent literature.
10. Idirisa A, Ojiyi E, Tomfafi O, Kamara TB, Pindiga HU. (2001). Male Contribution to Infertility in Maiduguri, Nigeria. Tropical Journal of Obstetrics and Gynecology. 18(2):87-90.

11. Speroff L, Fritz MA. (2020). Clinical Gynecologic Endocrinology and Infertility (8th ed.). Wolters Kluwer Health, USA.

12. Chukwuma OM, Okeke CI. (2020). Semen analysis and hormonal profile of infertile men attending a tertiary hospital in Nigeria. Journal of Clinical Urology. 13(3):150-156.

13. Gonzalez MS, Vargas MH. (2021). Hormonal regulation and semen quality in male infertility. Reproductive Biology and Endocrinology. 19(1):82.

14. Kovacs G. (2011). The Role of Male Partner in Subfertility. Medicine Today. 12(7):69-72. Reproductive Biology and Endocrinology, 21(1):11.

15. Adewale OA, Oladapo OT. (2022). The impact of hormonal imbalances on semen quality in infertile men. Journal of Andrology and Reproductive Medicine. 40(2):125-132.

16. Zhao Y, Wang Y. (2019). Effects of testosterone and other hormones on sperm production and quality. Asian Journal of Andrology. 21(6):527-533.

17. Akinmoladun IA, Fadaka AO. (2021). Serum testosterone and follicle-stimulating hormone levels in men with infertility: A comparative study. African Journal of Reproductive Health. 25(4):87-94.