

MALE INFERTILITY - A LITERATURE REVIEW

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ABSTRACT

Infertility and problems of impaired fecundity have been a concern through ages and is also a significant clinical problem today, which affects 8–12% of couples worldwide. Of all infertility cases, approximately 40–50% is due to “male factor” infertility and as many as 2% of all men will exhibit suboptimal sperm parameters. It may be one or a combination of low sperm concentration, poor sperm motility, or abnormal morphology. The rates of infertility in less industrialized nations are markedly higher and infectious diseases are responsible for a greater proportion of infertility. The present literature will help in knowing the trends of male factor infertility in developing nations like India and to find out in future, various factors that may be responsible for male infertility.

KEYWORDS:

Male Infertility, Oxidative stress, reactive oxygen species, genetic factors, antioxidants

INTRODUCTION

Infertility is a condition with psychological, economic, medical implications resulting in trauma, stress, particularly in a social set-up like ours, with a strong emphasis on child-bearing. According to the International Committee for Monitoring Assisted Reproductive Technology, World Health Organization (WHO), infertility is a disease of reproductive system defined by failure to achieve the clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. It can also be defined as failure of couple to conceive after 12 months of regular intercourse without the use of contraception in women <35 years; and after 6 months of regular intercourse without the use of contraception in women ≥35 years.

GLOBAL INCIDENCE OF INFERTILITY

There are no reliable figures for global prevalence of infertility, but estimates suggest that nearly 72.4 million couples globally experience fertility problems. As per the WHO estimates 60–80 million couples worldwide currently suffer from infertility. It varies across regions of the world and is estimated to affect 8–12% of couples worldwide. It tends to be the highest in countries with high fertility rates; an occurrence termed “barrenness amid plenty.” In recent decades, infertility has impacted an increasing number of couples. Approximately, 10% of couples in the United States are defined as infertile based on the inability to conceive after 12 months of unprotected intercourse. According to National Center for Health Statistics, the absolute numbers of impaired fecundity increased by about 2.7 million women, from 4.56 million in 1982 to 7.26 million in 2002, then fell slightly to 6.71 million in 2006–2010. Moreover, the fertility rate in men younger than age 30 years has also decreased worldwide by 15%.

INFERTILITY IN INDIA

As per the WHO, the overall prevalence of primary infertility ranges between 3.9% and 16.8%. Also, the estimates of infertility vary widely among Indian states from 3.7% in Uttar Pradesh, Himachal Pradesh, and Maharashtra, to 5% in Andhra Pradesh, and 15% in Kashmir. Moreover, the prevalence of primary infertility has also been shown to vary across the tribes and castes within the same region in India.

MALE INFERTILITY: AN IMPORTANT FACTOR

Male infertility refers to a male's inability to result pregnancy in a fertile female. "Male factor" infertility is seen as an alteration in sperm concentration and/or motility and/or morphology in at least one sample of two sperm analyzes, collected 1 and 4 weeks apart. In humans, it accounts for 40-50% of infertility and affects approximately 7% of all men. Male infertility is commonly due to deficiencies in the semen, and semen quality is used as a surrogate measure of male fecundity.

Males with sperm parameters below the WHO normal values are considered to have male factor infertility. The most significant of these are low sperm concentration (oligospermia), poor sperm motility (asthenospermia), and abnormal sperm morphology (teratospermia). Other factors less well associated with infertility include semen volume and other seminal markers of epididymal, prostatic, and seminal vesicle function. As high as 90% of male infertility problems are related to count and there is a positive association between the abnormal semen parameters and sperm

NORMAL SEMINAL PARAMETERS

- Volume: 1.5 mL (95% CI: 1.4–1.7)
- Sperm concentration: 15 million spermatozoa/mL (95% CI: 12–16)
- Total sperm number: 39 million spermatozoa per ejaculate (95% CI: 33–46)
- Morphology: 4% normal forms (95% CI: 3–4), using "strict" Tygerberg method.
- Vitality: 58% live (95% CI: 55–63)
- Progressive motility: 32% (95% CI: 31–34)
- Total (progressive + nonprogressive motility): 40% (95% CI: 38–42).

ABNORMALITIES OF SPERM COUNT AND MORPHOLOGY

- Azoospermia: Absence of sperm in seminal plasma
- Low sperm count (oligozoospermia: <15 million sperms/mL).

ABNORMALITIES RELATED TO SPERM MOTILITY

The efficient passage of spermatozoa through the cervical mucus depends on rapid progressive motility, that is, spermatozoa with a forward progression of at least 25 $\mu\text{m/s}$. A normal semen analysis must contain at least 50% grade A and B, progressively motile spermatozoa. Persistent poor motility is a predictor of failure in fertilization.

ABNORMAL SPERM STRUCTURE AND SHAPE (TERATOZOOSPERMIA)

For morphology of sperms, smears can be scored using the WHO classification, or by Kruger's strict criteria classification. Morphology should be used along with other parameters, and not as an isolated parameter when determining clinical implications.

GLOBAL TRENDS OF MALE INFERTILITY

As early as in the 1980s, many scientists/clinicians reported an emerging concern about deteriorating semen quality. To better elucidate this problem, a study was done in 1992, which included the meta-analysis of, which had 61 articles 14,947 men with no previous history of infertility.

CAUSES

- ✓ **Azoospermia** - Absence of sperms in semen
- ✓ **Oligospermia** - Less number of sperms in semen
- ✓ **Teratospermia** - Sperms with abnormal morphology/structure
- ✓ **Asthenozoospermia** - Reduced sperm motility

RISK FACTORS

- ❖ Stress can significantly increase your risk towards infertility
- ❖ Obesity can also cause Male Infertility
- ❖ Alcohol consumption can cause hormonal imbalance and low sperm production
- ❖ Smoking may cause low sperm production and may also affect its morphology
- ❖ Drug abuse
- ❖ History of infections including sexually transmitted diseases
- ❖ Previous history of surgery or diseases like mumps
- ❖ Trauma to testicles
- ❖ Family history of infertility
- ❖ Certain medical conditions like tumors and use of certain medicines which can affect fertility
- ❖ Excessive exercising can cause production of too much of steroid hormones, affecting fertility

PATHOPHYSIOLOGY

Infertility can result from disorders of the testicles themselves or an abnormality affecting other hormonal systems including the hypothalamus, pituitary, thyroid and adrenal glands. Low testosterone (male hypogonadism) and other hormonal problems have a number of possible

Pre-testicular causes include hypogonadotropic hypogonadism, erectile dysfunction, or coital disorders such as retrograde ejaculation, anejaculation, genetic factors, and chromosomal abnormalities.

DIAGNOSTIC EVALUATION

- ✓ **Semen analysis:** Semen samples can be obtained in a couple of different ways.
- ✓ **Scrotal ultrasound:** This test uses high-frequency sound waves to produce images inside your body.
- ✓ **Transrectal ultrasound:** A small, lubricated wand is inserted into your rectum.
- ✓ **Hormone testing:** Hormones produced by the pituitary gland, hypothalamus and testicles play a key role in sexual development and sperm production.
- ✓ **Genetic tests:** When sperm concentration is extremely low, there could be a genetic cause.
- ✓ **Testicular biopsy:** This test involves removing samples from the testicle with a needle.

MANAGEMENT

- ❖ **Medicines:** Medicines like antibiotics may be required in cases where infection is suspected. Medicines are also given for erectile dysfunctions, premature ejaculation and low sperm count. Hormones may be required in case of hormonal deficiencies.
- ❖ **Surgery:** Surgery may be required in cases of Varicocele or blocked tubes which transport the sperms.
- ❖ **Assisted Reproductive Technologies (ART):** Depending on the case, Intrauterine insemination (IUI), In Vitro fertilization (IVF), Intracytoplasmic sperm injection (ICSI) may be required.

- ❖ **Treating infections.** Antibiotic treatment might cure an infection of the reproductive tract, but doesn't always restore fertility.
- ❖ **Treatments for sexual intercourse problems.** Medication or counselling can help improve fertility in conditions such as erectile dysfunction or premature ejaculation.

CONCLUSION

Hence, male infertility is an important cause of infertility with a strong impact on the psychology and physiology of couple. It can be due to several reasons. Also, the present literature reveals that its trend is increasing in India. Therefore, it's the need of the hour to look into the factors which are causing such a rise in male infertility and attempts should be made to control such factors in near future.

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