



Role of Herbal Medicines on Male Infertility - A Review

B. Ashwinidevi^{1*}, S. Kavitha² and R. Yasodai³

¹Department of Anatomy, Vinayaka Mission Research University, Salem, India.

²Department of Anatomy, Vinayaka Mission Research University, Vinayaka Mission Kirupanandavariyar Medical College and Hospital, Salem, India.

³Department of Anatomy, Sri Ramakrishna Dentalcollege, Coimbatore, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i43B32554

Editor(s):

(1) Dr. Sawadogo Wamtinga Richard, Ministry of Higher Education, Scientific Research and Innovation, Burkina Faso.

Reviewers:

(1) Geeta Deodatt Parulkar Kayachikitsa, Maharashtra University of Health Sciences, India.

(2) Amit L Tamadaddi, Ayurved University, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/73539>

Review Article

Received 28 June 2021

Accepted 08 September 2021

Published 11 September 2021

ABSTRACT

Infertility is one of the most serious social problems are caused by many Factors such as genetic, environmental factors about 70% of cases remain unknown, Protective Mechanisms of the Sperm is called Spermatogenesis. The formation of the sperm from a germ cell precursor, its maturation, transport, viability, and the final steps, any changes happens in this series which causes infertility condition. The clinical detection of infertility is identified by analysis of semen. The main parameters are sperm concentration, morphology and viability of sperm .the origin of infertility in men happened by a lot of factors are hormonal disorders, mental stress, physical abnormalities, lifestyle problems, obesity , sexual issues, genetic abnormalities and deficiency of single-genes. This article aimed on the histological study testicular tissue samples, the structure of male reproductive, causes for male infertility, procedures available to find the genes engaged in infertility, the current remedial measures for male infertility. Whereas, the herbal therapies, are better positioned to offer more holistic approaches to improve male reproductive health. In traditional medicine which helps to nourishes and stimulates the sexual tissues and ameliorate male reproductive health issues.

Keywords: Male infertility; protective mechanism; hormonal defect genetic factors; ayurvedic medicines.

1. INTRODUCTION

The condition of Infertility to find the couples inability to conceive more than one year of pregnancy planning, it is most commonly affects 10–15 percent of couples every 100 couples. About the latest WHO statistics, about 50–80 million people suffer from infertility in both the gender worldwide [1]. In this study, we have reviewed the study of histological variation, male reproductive anatomical organization, the relative importance of causes infertility in male, steps to identify genes, existing therapeutic procedures, recovery of sperm procedures [2,3].

2. FORMATION OF TESTIS

Human reproductive organs includes pair of testes, duct and the accessory organs which is important for the growth, maturation and for gamete transmission. The both testis are enclosed by the tunica albuginea capsule in the testicular sack. The components of testicles include seminiferous tubules and intercellular portions between seminiferous tubule. Leydig cells are responsible for the production of testosterone and insulin-like factor 3. These tubes are covered by epithelial tissue and having two types of cells: Sertoli cells and spermatogenic cells [4]. The Sertoli cells function is to give nourishment and growth of sperm through the developmental stages of spermatogenesis. Sertoli cells control the production of sperm release into the lumen, phagocytosis of the degenerate germ cells and additional number of cytoplasm resulting from release of sperm. In adult, Sertoli cells are meiotically not active, terminates in the meiotic first division of the germ cells, produce tight junctions between these cells, called as the Blood-Testis Barrier. Two main functions for Blood testis barrier are: (a) the physical segregation of the germ cells that save them against the immune system; (b) giving an circumstances for meiosis and sperm maturation and development [5,6].

3. SPERMATOGENESIS

Spermatogenesis is one of the process for the development of male gametes into the seminiferous tubules. Each cycle of spermatogenesis in humans requires 16 days and almost 4.6 cycles for development and

differentiation of spermatogenic cells into adult sperm, which takes approximately 74 days in humans. The regulation of spermatogenesis occurs in two main stages: a) hormonal and endocrine b) paracrine and autocrine. The spermatogenesis process divided into four general phases: 1) mitotic proliferation and spermatogonial differentiation into pre-leptotene spermatocytes (spermatogoniogenesis) 2) Meiotic division of spermatocytes that leads to spermatids (meiosis) 3) Conversion of round spermatids into adult spermatids (spermogenesis); 4) Release of elongated spermatids into the lumen

4. SPERMATOGONIOGENESIS

The germ cell lines originate from the primary germ cell PGC sperm develop from PGC, when they become spermatogonia. Spermatogenesis divided by mitosis, meiosis and give rise of 2 secondary spermatocyte and then secondary spermatocyte divide and gives off 4 spermatids, they are haploid in number.

5. MAIN CAUSES OF INFERTILITY

The diagnosis of infertility in men is mainly based on semen analysis. Unusual parameters of semen include: sperm concentration, appearance and motility. There are seven main cases of semen-related abnormalities. There are various reasons for male infertility, the most important of which are: Hormonal deficits, physical causes, sexually transmitted problems, environment and lifestyle, and genetic factors [7].

6. HORMONAL DEFECTS

The male reproductive hormone axis is known as the hypothalamic-pituitary-gonadal axis. It consists of 3 major components: the hypothalamic, pituitary and testicular. The brain is unable to produce gonadotropic releasing hormone (GnRH), this disorder results in a lack of testosterone and stopping sperm production known as hypogonadotropic hypogonadism. Treatment options for gonadotropin-releasing hormone (GnRH) deficiency include: Use of sex steroids, gonadotropins and injection of GnRH releasing hormone.

Testosterone injections are mainly used to improve testicular growth, normalize testosterone concentration, and stimulate the development of secondary sexual traits. Conversely, elevated concentrations of LH and FSH are associated with low concentrations of testosterone, leading to defects in spermatogenesis. Increased prolactin levels can also lead to reduced sperm production, libido and impotence [8].

7. PHYSICAL FACTORS

Enlargement of the sperm vessels known as varicocele, it affecting about 40% of men infertility. Testicular torsion is caused by pressure on the sperm vessels and impaired testicular circulation. Chronic and acute genital tract infections also causes of infertility -Mumps viral infection can lead to testicular atrophy and infertility Sexually transmitted diseases such as Gonorrhoea and Chlamydia can also lead to infertility in men due to obstruction in the epididymis. In some cases, semen is ejaculated in the bladder, known as recurrent ejaculation, and accounts for about 2% of infertility causes anatomical changes.

8. ERECTILE DYSFUNCTION

Erectile dysfunction causes impotence, that leads to quick ejaculation and helplessness to ejaculate the sperms.

9. ENVIRONMENT AND LIFESTYLE

Person who is prolonged exposure to radiation can lead to less sperm production, and complete infertility. People who are high temperatures producing works (such as bakeries, drivers) can have negative effects on fertility. Chronic alcohol consumption and more smoking, effect on sperm quality, fertility,less/Poor nutrition, obese can also play an important role in male infertility and testosterone production. In addition, studies to prevent the infertility is controlled by use antioxidants and vitamin C-containing substances.

10. GENETIC FACTORS

It plays a role in 15% of male infertility by two groups: chromosomal abnormalities and single-gene mutations. Studies reported that About 14% of men with azoospermia and 2% of men with oligospermia have chromosomal abnormalities,

due to increased FSH and Y chromosome disomy.

11. STRATEGIES

There are two general approaches to infertility by gene approach and Whole-genome approach. The recent technological advances in whole-genome studies such as single-nucleotide polymorphism (SNP) microarray and high-throughput sequencing technologies are use for finding effective genes in infertility issues.

12. SPERM RECOVER

For infertile men, sperm were recovered from the testicles or epididymis. In the Obstructive and non-obstructive azoospermia—are two major categories of azoospermia. In Obstructive azoospermia is the result of physical obstruction due to infection, vasectomy, congenital absence of the vas deferens , epididymal obstruction other condition, NO. Best way is to extract sperm from the testis (TESE) and intracytoplasmic sperm injection (ICSI) [5,9].

12.1 Usage of Ayurvedic Herbs

12.1.1 Ashwagandha (*Withania somnifera*)

It has Innumerable beneficial qualities to alleviate male reproductive disorders such as induction of spermatogenesis, improved blood flow and regulated endocrines. It helps to relieves conditions such as spermatorrhea, nocturnal emission, premature ejaculation, and enlarged prostate. The aqueous extract of the plant helps to improve spermatogenesis, increase in serum hormone levels in the oligospermic patients and also used against oxidative stress, improved antioxidants, and enhanced semen volume and vitamins A, C, and E.

12.1.2 Kapikacchu (*Mucuna pruriens*)

It is capable of stimulating sexual activities,also enhanced intromission frequency, mitigation of ROS, apoptosis regulation, and increase in the number of germ cells in rat . L-DOPA, constituents of the plant contributes to its pro-spermatogenic activity. The seed extract of *M. pruriens* improved in sexual potency and behavior, libido, sperm parameters, and endocrine levels, ameliorate the levels lipids, triglycerides, cholesterol, phospholipids, vitamin A, C, and E and corrected fructose nullifying oxidative stress induced lipid peroxidation in

seminal vesicles and restored the levels of SOD, catalase, GSH, and ascorbic acid in seminal plasma, elevates testosterone, LH, dopamine, adrenaline, as well as noradrenaline levels and decreased levels of FSH and PRL in infertile men.

12.1.3 Shatavari (*Asparagus racemosus*)

It serve as tonic prevents depletion of sperm caused by burning.

12.1.4 Vidarikandha (*Ipomoea digitata*)

It is effective in promoting spermatogenesis, muscle tone, motor coordination and nullifies sexual debility associated with nervousness and adrenal stress.

12.1.5 *Curculigo orchioides* (black) Musli

It is an aphrodisiac or rejuvenator ameliorating sexual arousal and performance, also promotes anabolic and spermatogenic effect by increased weight. this herb is useful in ameliorating the decreased spermatogenesis and owing to the heat shock protein [6].

12.1.6 *Chlorophytum borivilianum* Safed Musli (*Chlorophytum borivilianum*)

It is an effective aphrodisiac and sexual stimulant helps in Mechanism of action Male reproductive functions are restored and controlled by induction or inhibition of neurochemicals, regulation of neuroendocrine. The herbal therapies may ameliorate functions at 2 levels. (1) Herbs may act on nervous system improving the responsiveness of male reproductive tissues is mediated by an neurochemicals, serotonin and dopamine are the prime controllers of sexual behavior with serotonin mediating inhibitory functions and dopamine playing an excitatory role (2) The effects of herbal therapies to regulate the level of the nitric oxide support their contribution towards treating erectile dysfunctions, high crease blood flow(3) Herbs can regulated the sex hormones importantly testosterone, LH, FSH and interstitial hormones , the development of secondary male sexual organs, accentuate pubertal changes and increase overall male fertility

13. CONCLUSION

Male infertility is global issue but still reason is unknown it t necessary to know key factors

diagnostic and noninvasive biomarkers. With the advances in technology and the introduction of new methods and approaches, it is hope to find the causes of male infertility and treatments. therapeutic approach the plant products can be used as stimulants or tonics to improve male reproductive system provide better nourishment to rejuvenate the quality, nourishing properties aphrodisiacs, neuroendocrine control as well as structural and functional aspects of reproductive tissues, qualitative and quantitative improvement in semen and also sperm morphology and motility.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Vander Borgh M, Wyns C. Fertility and infertility: definition and epidemiology. Clin Biochem. 2018;62:2–10. DOI: 10.1016/j.clinbiochem.2018.03.012
2. Kumar N, Singh AK. Trends of male factor infertility, an important cause of infertility: A review of literature. J Hum Reprod Sci. 2015;8(4):191. DOI: 10.4103/0974-1208.170370
3. Agarwal A, Mulgund A, Hamada A, Chyatte MR. A unique view on male infertility around the globe. Reprod Biol Endocrinol. 2015;13(1):37. DOI: 10.1186/s12958-015-0032-1
4. Zegers-Hochschild F, Adamson GD, Dyer S, et al. The international glossary on infertility and fertility care, 2017. Hum Reprod. 2017;32(9):1786–1801. DOI: 10.1093/humrep/dex234
5. ESHRE Capri Workshop Group, Albertini DF, Anderson R, Bhattacharya S, et al. A prognosis-based approach to infertility: understanding the role of time. Hum Reprod. 2017;32(8):1556–1559. DOI: 10.1093/humrep/dex214
6. Turchi P. Prevalence, definition, and classification of infertility. In: Cavallini

- G, Beretta G, editors. Clinical Management of Male Infertility. Springer. 2015;5–11.
7. Masoumi SZ, Parsa P, Darvish N, Mokhtari S, Yavangi M, Roshanaei G. An epidemiologic survey on the causes of infertility in patients referred to infertility center in Fatemeh Hospital in Hamadan. Iran J Reprod Med. 2015; 13(8):513.
 8. Qi X, Wang K, Zhou G, Xu Z, Yu J, Zhang W. The role of testicular artery in laparoscopic varicocelectomy: A systematic review and meta-analysis. Int Urol Nephrol. 2016;48(6):955–965.
DOI: 10.1007/s11255-016-1254-7
 9. Mehrabani D, Hassanshahi MA, Tamadon A, et al. Adipose tissue-derived mesenchymal stem cells repair germinal cells of seminiferous tubules of busulfan-induced azoospermic rats. J Hum Reprod Sci. 2015;8(2):103.

© 2021 Ashwinidevi et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<https://www.sdiarticle4.com/review-history/73539>