

## **EXPERIENCE OF SPERMATOGENESIS RESTORATION BY USING THE COMPLEX PHYTOTHERAPY IN EXCRETORY-TOXIC INFERTILITY.**

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**Introduction.** Fertility is the ability to conceive a foetus or to become pregnant. Fertility is the probability of giving birth to a live child conceived during this menstrual cycle. The term infertility is used when pregnancy does not occur with regular sexual life of the couple (without contraception) for one year. Male infertility accounts for half of the cases [1]. To date, about 10-15% of married couples are infertile [2]. According to the WHO, the critical level is 15%. Therefore, the importance of correcting this situation is obvious.

The causes of male infertility can be localized at different levels. The testicles, ejaculatory ducts or additional gonads, and the mechanisms of ejaculation can be damaged, but the pathology can also lie in the central structures - the hypothalamus and pituitary gland, and in the target organs of androgens as well. The second principle of classification of male fertility disorders is the nature of cause, i.e. endocrine, genetic, inflammatory, etc. [1].

In Ukraine, the following male infertility classification is used: autoimmune, discorrelated, relative, secretory-toxic, secretory-endocrine, combined, excretory-toxic and secretory-obstructive [3].

The subject of our study was excretory-toxic infertility (ETI) - the most common among the population. The reason for this is the high, almost epidemic, prevalence of diseases caused by urogenital infections. Most often, ETI is one of the consequences of the inflammatory process in the male genitalia. The most common cause of ETI is chronic prostatitis and its complications. In 40-60% of cases, ETI is a complication of inflammatory diseases of the male genitalia.

Causes of excretory-toxic infertility in chronic prostatitis:

- exposure to bacterial and mucus toxins;
- change in pH of ejaculate in alkaline direction;
- changes in the hypothalamic-pituitary-gonadal axis;
- disorders of testosterone metabolism in the prostate;
- autoimmunization;
- decreased levels of citric acid and fructose;
- disorders of the enzyme and isoenzyme spectrum of ejaculate [4].

The most common infections are chlamydial, ureaplasma, viral and Trichomonas infections in combination with bacterial flora. But monoinfections are very rare. In most cases, it is a mixed protozoan-bacterial process [5]. In addition, chronic prostatitis is often complicated by the spread of infection (vesiculitis, orchepididymitis, colliculitis, etc.) [6]. The presence of mixed infection requires the creation of high concentrations of antibiotic in the target organs and long-term action to ensure eradication of the pathogen. This form of therapy is a factor itself that damages spermatogenesis [5].

Thus, there is a steady decline in male reproductive health, so the emphasis to solve this problem is made on assisted reproductive technologies, which are expensive and not always effective.

**The purpose of research** was to study the effectiveness of the complex remedy Adrius in excretory-toxic infertility in men after treatment of chronic prostatitis caused by STIs.

**Materials and methods of research.** The study involved 50 men aged 26-39 years who were diagnosed with chronic prostatitis complicated by excretory-toxic infertility (ETI).

In the treatment of chronic prostatitis complicated by ETI, a full range of individually selected treatments, such as antibacterial treatment, anti-inflammatory treatment and physiotherapy, was carried out.

The following tests have been performed to all patients:

1. Spermogram (before and after treatment).
2. Semen analysis (before and after treatment).
3. Hepatitis B and C blood tests.
4. Passive hemagglutination reaction test (PHAT).
5. Biochemical analysis of blood.
6. Blood and urine tests.
7. International Prostate Symptom Score (IPSS, CP/CPPS).
8. Ultrasound examination of prostate and scrotum.
9. Analysis of prostate secretion (in the absence of contraindications) before and after treatment).
10. Gram stain of urethral discharge (before and after treatment).
11. Study of the urethral smears for *Chlamydia trachomatis*, *Trichomonas vaginalis*, *Mycoplasma spp.*, *Ureaplasma spp.*, HSV, CMV, *Neisseria gonorrhoeae* (before and after treatment).

A laboratory monitoring of eradication of pathogens was carried out after a course of STI treatment, anti-inflammatory therapy before rehabilitation therapy.

After the basic course of STI treatment with a positive result of control tests for STI curability, spermatogenesis-stimulating therapy was performed.

Patients were divided into two groups for 25 people each. The first group (25 patients) received 1 capsule of Adrius twice a day for 3 months as a restorative, spermatogenesis-stimulating therapy. Patients in the comparison group (25 patients) received 1 tablet of Undevit multivitamin complex twice a day for 3 months.

Adrius is a balanced natural complex for improving the reproductive function of men. Adrius contains:

- Withania somnifera root and leaf extract – 100 mg;
- Mucuna pruriens fruit extract – 90 mg;
- Asparagus adscendens root extract – 80 mg;
- Tribulus terrestris fruit extract – 250 mg;
- Yohimbine HCl USP – 2,5 mg;
- Apilac (Royal jelly) – 10 mg.

Characteristics of active ingredients:

1. *Withania somnifera* root and leaf extract. *Withania somnifera* is known as one of the most active aphrodisiacs [7]. *Withania somnifera* enhances testosterone synthesis and improves spermatogenesis, in particular, it increases sperm count and motility [7,8,9]. The plant exhibits pronounced anti-stress properties by eliminating psychogenic causes of sexual dysfunction [10,11]. In addition, the plant has antioxidant, immunostimulatory, chondroprotective, cardioprotective properties and improves mental performance. Due to its antiproliferative effect *Withania* prevents the development of hyperplastic processes in the prostate [7].

2. *Mucuna pruriens* fruit extract enhances libido, reduces sperm count, improves sperm production and quality, and acts as a general tonic and tonic for sexual disorders [13]. In addition, the plant has a positive effect on other organs and systems of the body due to anabolic, antidiabetic, anticholesterolemic, antidepressant and anti-inflammatory properties.

3. *Asparagus adscendens* root extract is used as an aphrodisiac and for various erectile disorders, such as erectile dysfunction, premature ejaculation, lack of sexual desire [14]. *Asparagus* exhibits pronounced adaptogenic and tonic properties.

4. *Tribulus terrestris* fruit extract has a pronounced effect on the reproductive system, in particular, enhances libido, stimulates erectile function and spermatogenesis [15,16]. This effect is mainly due to increased testosterone synthesis [15]. In addition, *Tribulus terrestris* improves the condition of the cardiovascular system and kidneys.

Among other positive properties of *Tribulus terrestris* are important anti-inflammatory, antioxidant and antimicrobial effects.

5. Yohimbine hydrochloride is an alkaloid derived from the bark of *Corynanthe Yohimbe* tree growing in West Africa. It is effective for erectile dysfunction. Yohimbine normalizes sexual function impaired as a result of stress [17].

6. Apilac, or so-called royal jelly, is a secretion produced by worker bees and intended for feeding queen bees. It has a very rich chemical composition: proteins, amino acids, polyunsaturated fatty acids, enzymes, vitamins, carbohydrates, minerals [18]. The effect of royal jelly on sexual function is characterized by increased sexual desire, increased testosterone levels and sperm activity [18,19]. In addition, royal jelly has a general tonic effect, increases the body's resistance to stress and stimulates metabolism [18,19]. An important effect is to reduce blood cholesterol levels and to improve the condition of the cardiovascular system in atherosclerosis [18].

Standard values of ejaculate parameters, according to the WHO guidelines (1999):

Ejaculate volume	2 ml
pH	7.2
Sperm count	20 mil/ml
Motility	50% of forward-moving sperm (category a + b) or 25% of fast-moving sperm (category a)
Morphology	30% of normal shaped sperm
Viability	50% of live sperm
Leukocytes	less than 1 mil/ml
Fructose	10-60 mmol/l
Citric acid	20-32 mmol/l
MAR-test	less than 50% of sperm with adherent particles or erythrocytes

It is clear that the study of ejaculate parameters is the main thing in assessing male fertility.

Normospermia	Normal ejaculate (in accordance with the above data)
Oligospermia	less than 20 mil/ml
Asthenospermia	less than 50% of sperm capable of moving forward. (category a + b) and less than 25% of sperm of category a
Teratospermia	less than 30% of sperm of normal structure
Oligo-astheno-teratospermia	Disturbance of all three parameters

Azoospermia	Absence of sperm in the ejaculate
Parvispermia	Ejaculate volume is less than 2 ml
Aspermia	No ejaculate

After 13 years, the WHO criteria (2012) showing the minimum normal values have been changed to the following ones:

Ejaculate volume	1.5 ml
Sperm count	15 millions
Motility (a+c)	40 and more
Live sperm count	58%
Morphology	4%
pH	more than 7.2
Leukocytes	less than 1 mil/ml
MAR-test	less than 50%

THE USE OF ADRIUS AFTER STI ANTIBIOTIC THERAPY HAS SIGNIFICANTLY IMPROVED THE QUALITATIVE AND QUANTITATIVE INDICATORS OF THE SPERMOGRAM

**Results and discussion.** The results are shown in the table 1.

According to the results of the study, chronic prostatitis was accompanied by a significant deterioration in sperm quality. During the chronic inflammatory process there was a change in pH of sperm in alkaline direction (up to 8.2 at a rate 7.2), a significant decrease of the sperm count in the ejaculate, and a decrease of sperm motility to critically low levels (Table 1). At the same time, the number of pathological sperm increased and their viability decreased - the live sperm count in the ejaculate was 30% lower than normal. Confirmation of the pronounced inflammatory process in the prostate was the increased number of leukocytes in semen.

Antibiotic therapy has slightly improved the patients' spermograms, but the fertility rates have not reached normal values.

Table

Analysis of the spermogram after 3 months of taking Adrius at a dose compared with the control group wherein patients took a multivitamin complex 1 tablet twice a day for 3 months.

Spermogram parameter	Norm	Before therapy (n=50)	After STI therapy (n=50)	After receiving Adrius (n=25)	After receiving a multivitamin complex (n=25)
Ejaculate volume (ml)	2.0-6.0	4.1±2.6	4.2±2.2	4.1±1.8	3.7±2.5
pH	7.2-8.0	8.2±0.7	7.8±0.2	7.6±0.3	8.0±0.2
Sperm count (million/ml)	20.0-120.0	17.5±11.3	25.2±10.3	43.2±13.5	33.1±14.2
Motility - % of sperm moving fast (category a)	>25	17±4	21±6	34±6	26±5
Morphology -% of normal shaped sperm	>30	23±8	25±9	46±7	32±6
Viability -% of live sperm	>50	35±8	41±5	59±4	43±2
Leukocytes (million/ml)	<1.0	34±14	1.8±1.2	0.6±0.4	0.8±0.4
MAR-test - % of sperm with adherent particles	<50	54±9	52±5	41±4	46±8

The analysis of the obtained data clearly shows a more pronounced positive dynamics of the quality of spermograms of patients taking Adrius, compared with the group of patients taking a multivitamin complex. Due to Adrius effect, the sperm count has increased by 71.4% compared to the data before taking Adrius, while under the influence of multivitamins –by 31.1% only.

An important parameter of the positive effect of Adrius on fertility is the increased sperm motility. In the experimental group of patients receiving Adrius, the actively motile sperm count (category **a**) has increased by 61.9% compared to the original data, while in the group of multivitamins – by 23.8% only.

Equally important is the normalization of sperm viability (% of live sperm) and the decreased number of pathological sperm. Against the background of receiving Adrius, the live sperm count has increased by 43.9%, and the number of normal germ cells has increased by 84% compared to the original data. Multivitamins have increased these rates by 4.8% and 28%, respectively.

No adverse effects were reported during the follow-up period.

Thus, Adrius is an effective and safe remedy to improve the quantitative and qualitative parameters of sperm and is recommended in the complex treatment of excretory-toxic infertility in men.

The list of references is in the editorial office.