

The Association of Reproductive Medicine of Uzbekistan



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REPRODUKTIV TIBBIYOT VA GENETIKA

# REPRODUCTIVE & G MEDICINE GENETICS

РЕПРОДУКТИВНАЯ МЕДИЦИНА И ГЕНЕТИКА

02 (03) 2025







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**GENETICS**  
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# REPRODUCTIVE & G MEDICINE ENETICS

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# ASSESSMENT OF DIAGNOSTIC AND THERAPEUTIC EFFECTIVENESS IN WOMEN WITH INFLAMMATORY INFERTILITY

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## **Аннотация**

В данной статье рассматривается совершенствование современных подходов к диагностике и лечению воспалительного бесплодия у женщин. Целью исследования является разработка комплексного подхода к выявлению воспалительного бесплодия у женщин и создание алгоритма дифференциальной диагностики с использованием клинических, лабораторных и инструментальных методов. Всего было обследовано 115 женщин, в том числе 40 с первичным бесплодием, 40 со вторичным бесплодием и 35 здоровых женщин (контрольная группа). Обследование включало клинический осмотр, бактериоскопию, функциональные тесты (УЗИ, гистеросальпингографию, лапароскопию) и ПЦР-тестирование. Для лечения была применена комплексная реабилитационная стратегия. Результаты показывают, что комплексный диагностический алгоритм имеет решающее значение для раннего выявления и повышения эффективности лечения воспалительного бесплодия.

**Ключевые слова:** воспалительное бесплодие, ИППП, диагностика, ПЦР, ГСГ.

## **Annotatsiya**

Ushbu maqolada ayollardagi yallig'lanishga bog'liq bepushtlikni zamonaviy tashxislash va davolash usullarini takomillash-tirish masalalari muhokama qilinadi. Tadqiqotning maqsadi ayollarda yallig'lanishga bog'liq bepushtlikni aniqlashda kompleks yondashuvni ishlab chiqish va klinik-laboratoriya hamda instrumental usullardan foydalangan holda differensial tashxis algoritmini yaratishdan iborat. Jami 115 nafar ayol tekshirildi, ulardan 40 nafari birlamchi bepushtlik, 40 nafari ikkilamchi bepushtlik bilan og'rigan va 35 nafari sog'lom ayollar (nazorat guruhi) edi. Baholash klinik tekshiruv, bakterioskopiya, funksional tekshiruvlar (ultratovush, gisterosalpingografiya, laparoskopiya) va PZR testidan iborat bo'ldi. Davolash uchun kompleks reabilitatsiya strategiyasi qo'llanildi. Natijalar shuni ko'rsatadiki, yallig'lanishga bog'liq bepushtlikni erta aniqlash va davolash samaradorligini oshirish uchun yaxlit diagnostika algoritmi muhim ahamiyatga ega.

**Kalit so'zlar:** yallig'lanishga bog'liq bepushtlik, JYOYK, tashxis, PZR, GSG.

## **Annotation**

This article addresses the improvement of modern diagnostic and treatment approaches for inflammatory infertility in women. The objective of the study was to develop a comprehensive approach for identifying inflammatory infertility in women and to create a differential diagnostic algorithm using clinical, laboratory, and instrumental methods. A total of 115 women were examined, including 40 with primary infertility, 40 with secondary infertility, and 35 healthy women (control group). The evaluation involved clinical examination, bacterioscopy, functional tests (ultrasound, hysterosalpingography, laparoscopy), and PCR testing. A comprehensive rehabilitation strategy was applied for treatment. The results demonstrate that an integrated diagnostic algorithm is crucial for early detection and improving the effectiveness of treatment in inflammatory infertility.

**Keywords:** inflammatory infertility, STIs, diagnosis, PCR, HSG.

**Introduction:** Infertility remains a pressing medical and social issue in modern reproductive health care, affecting millions of women worldwide. Among the various etiological factors, inflammation-related causes are gaining increasing recognition due to their high prevalence and serious long-term consequences. Chronic pelvic inflammatory diseases, often resulting from sexually transmitted infections (STIs), play a key role in the disruption of reproductive function, leading to tubal damage, pelvic adhesions, and impaired endometrial receptivity. According to global epidemiological data, inflammatory factors are responsible for approximately 35% to 60% of female infertility cases, particularly involving tubal-peritoneal pathology. Infections such as *Chlamydia trachomatis*, *Mycoplasma hominis*, and *Ureaplasma urealyticum* are among the most common pathogens leading to asymptomatic or oligo-symptomatic inflammation of the upper genital tract. The insidious nature of these infections often delays diagnosis and treatment, thereby reducing the chances of natural conception and increasing the risk of complications. Timely identification of inflammation-induced infertility requires a multidisciplinary approach that combines clinical evaluation, microbiological analysis, imaging diagnostics, and molecular techniques. Conventional methods, such as bacterioscopy and ultrasound, provide basic insights, but they are often insufficient for detecting subclinical or chronic inflammatory processes. Advanced techniques like polymerase chain reaction (PCR), hysterosalpingography (HSG), and laparoscopy are necessary for a more precise diagnosis and individualized treatment planning. Given the complexity of the condition, there is a critical need to improve diagnostic accuracy and therapeutic outcomes through comprehensive assessment protocols. This study aims to develop and validate a clinical algorithm that integrates modern diagnostic modalities for effective management of inflammatory infertility in women.

**The purpose of this study is to** improve diagnostic and therapeutic approaches in women with inflammatory infertility by developing a comprehensive strategy that integrates clinical, laboratory, instrumental, and molecular diagnostic methods for more effective identification and treatment.

**Materials and Methods:** The study was conducted among 115 married women aged 18 to 40 years. Participants were divided into the following groups:

1st group – Women with inflammatory primary infertility (n=40)

2nd group – Women with inflammatory secondary infertility (n=40)

3rd group – Control group, clinically healthy women (n=35)

The diagnostic methods applied included:

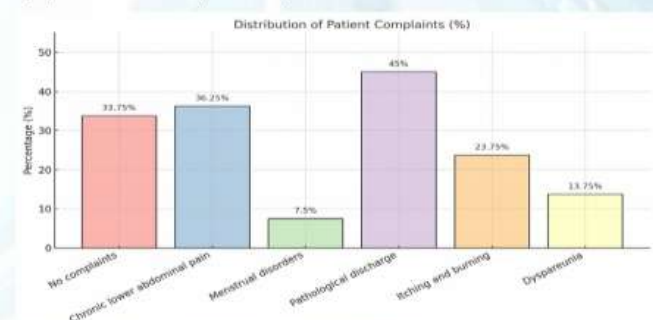
- ✓ Clinical and anamnestic evaluation
- ✓ Bacterioscopic and bacteriological analysis
- ✓ Ultrasound examination (USG)
- ✓ Hysterosalpingography (HSG)

- ✓ Laparoscopy
- ✓ PCR testing for *Chlamydia trachomatis*, *Mycoplasma*, and *Ureaplasma*

**Results:** A total of 115 women participated in the study and were divided into three groups: primary infertility (n=40), secondary infertility (n=40), and a control group of healthy women (n=35). The following results were observed: Among the women with inflammatory infertility (n=80), the average age was  $23.4 \pm 3.2$  years in the primary infertility group,  $26.5 \pm 2.3$  years in the secondary infertility group, and  $26.2 \pm 1.9$  years in the control group.

The most common reason for seeking medical help among all participants was the inability to conceive. The average duration of infertility was  $4 \pm 3.7$  years in the primary group and  $6.4 \pm 2.4$  years in the secondary group. The duration of infertility was less than 2 years in 3 women (3.75%), up to 5 years in 40 women (50%), and more than 5 years in 37 women (46.25%).

The majority of the women reported specific symptoms: absence of complaints – 27 (33.75%), chronic lower abdominal pain – 29 (36.25%), menstrual irregularities – 6 (7.5%), pathological vaginal discharge – 36 (45%), itching and burning sensation in the vagina and urinary tract – 19 (23.75%), and dyspareunia – 11 (13.75%).



The average age of menarche was  $13.8 \pm 2.3$  years in the primary group,  $13.2 \pm 1.8$  years in the secondary group, and  $12.8 \pm 1.9$  years in the control group. Most women in all three groups had regular menstrual cycles – 67 (83.8%), while oligomenorrhea was identified in 13 women (16.2%). In the primary group, 35 women (87.5%) had regular cycles and 5 women (12.5%) had oligomenorrhea. In the secondary group, 32 (80%) had regular cycles and 8 (20%) had oligomenorrhea. All women in the control group had regular menstrual cycles.

The average age at the onset of sexual activity was  $19.1 \pm 4.1$  years in the primary group,  $19.5 \pm 4.6$  years in the secondary group, and  $19.7 \pm 3.8$  years in the control group. Although the average age of sexual debut was similar across the groups, in the secondary infertility group it more frequently occurred outside of marriage, often associated with inflammatory diseases of the reproductive organs, which are risk factors for infertility.

In the secondary infertility group (n=40), the distribution of outcomes from previous pregnancies was as follows: in 15

women (37.5%) the pregnancy ended unsuccessfully: 6 (15%) had spontaneous abortions, 5 (12.5%) had missed abortions, and 4 (10%) had ectopic pregnancies. In 12 women (30%), the pregnancy ended with childbirth, while in 13 cases (32.5%) it ended with a medical abortion. Thus, analysis of the obstetric history revealed that prior abortion (both spontaneous and medical) is a significant risk factor for the development of secondary infertility.

A majority of women with inflammatory infertility had concomitant extragenital diseases. In the primary infertility group, 32 women (80%) had various somatic diseases: chronic tonsillitis – 12 (30%), pyelonephritis – 1 (2.5%), and chronic cholecystitis – 4 (10%). In the secondary group, 33 women (82.5%) had somatic conditions, including chronic tonsillitis in 13 (32.5%) and chronic cholecystitis in 1 (2.5%).

**Bacterioscopic Characteristics of the Vagina and Cervical Canal in Inflammatory Infertility:** According to bacterioscopic examination results, pathological vaginal conditions were identified in 24 (60%) women in Group 1 and in 33 (82.5%) women in Group 2. Disruption of vaginal acid-base balance was observed in 68 (85%) of all patients, while normal pH levels were found only in 12 (15%) women. Based on the findings of vaginal smear microscopy, the following conditions were diagnosed: Vaginal normocenosis – 2 patients (2.5%), bacterial vaginosis – 65 patients (81.25%), nonspecific vaginitis – 9 patients (11.25%), vulvovaginal candidiasis – 4 patients (5%).

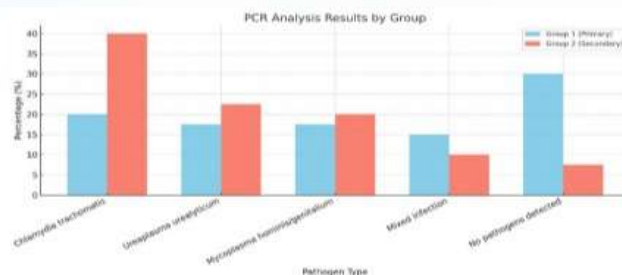
**Bacteriological Examination Results:** The bacteriological investigation revealed a higher prevalence of conditionally pathogenic microorganisms and sexually transmitted infections (STIs). Group 1 (Primary infertility, n=40): *Escherichia coli* – 9 (22.5%), *Staphylococcus epidermidis* – 4 (10%), *Gardnerella vaginalis* – 3 (7.5%), *Candida spp.* – 6 (15%), *Trichomonas vaginalis* – 1 (2.5%), *Neisseria gonorrhoeae* – 1 (2.5%), *Chlamydia trachomatis* – 8 (20%), *Ureaplasma urealyticum* – 7 (17.5%), *Mycoplasma hominis/genitalium* – 5 (12.5%), *Herpes simplex virus (HSV)* – 1 (2.5%), *Cytomegalovirus (CMV)* – 1 (2.5%).

Group 2 (Secondary infertility, n=40): *Escherichia coli* – 8 (20%), *Staphylococcus epidermidis* – 6 (15%), *Gardnerella vaginalis* – 5 (12.5%), *Candida spp.* – 8 (20%), *Trichomonas vaginalis* – 3 (7.5%), *Neisseria gonorrhoeae* – 2 (5.0%), *Chlamydia trachomatis* – 16 (40%), *Ureaplasma urealyticum* – 9 (22.5%), *Mycoplasma hominis/genitalium* – 10 (25%), *HSV* – 2 (5%), *CMV* – 1 (2.5%).

**PCR Analysis Results:** PCR (Polymerase Chain Reaction) testing was focused on identifying *Chlamydia trachomatis*, *Ureaplasma urealyticum*, and *Mycoplasma hominis/genitalium*, as well as their co-infections and cases where no pathogen was detected.

Group 1 (Primary infertility, n=40): *Chlamydia trachomatis* – 10 (20%), *Ureaplasma urealyticum* – 7 (17.5%), *Mycoplasma hominis/genitalium* – 7 (17.5%), mixed infection (*Chlamydia* + *Ureaplasma* + *Mycoplasma*) – 6 (15%), no pathogens detected – 10 (30%).

Group 2 (Secondary infertility, n=40): *Chlamydia trachomatis* – 16 (40%), *Ureaplasma urealyticum* – 9 (22.5%), *Mycoplasma hominis/genitalium* – 8 (20%), mixed infection – 4 (10%), no pathogens detected – 3 (7.5%).

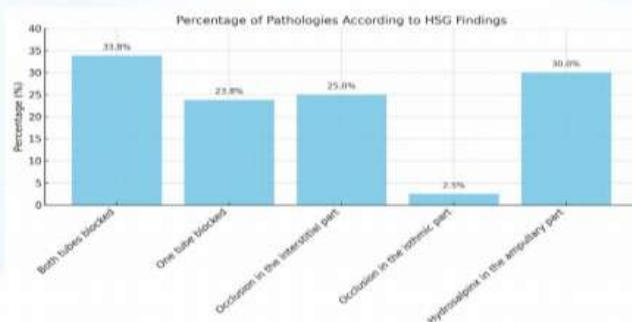


**Ultrasound Folliculometry:** To assess ovarian hormonal activity and confirm ovulation, all patients underwent serial transvaginal follicular ultrasound monitoring on days 9, 11, 13, 15, 17, 19, and 21 of the menstrual cycle. Folliculometry plays a crucial role in evaluating follicular growth dynamics, confirming ovulation, and quantitatively and qualitatively assessing endometrial thickness—important factors in the diagnosis of infertility.

**Results: Group 1 (Primary infertility):** Normal ovulation (n = 27): In 3 patients, follicle size was 20 mm with ovulation on day 14. In 10 patients, 19 mm follicles with ovulation on day 13. In 14 patients, follicles measured 18–22 mm with ovulation on days 14–15. Endometrial thickness ranged from 9 to 12 mm. Delayed ovulation (n = 13): In 5 patients, follicle size ranged from 22–25 mm with ovulation on day 16. In 8 patients, 23–26 mm follicles with ovulation on day 17. Endometrial thickness was 9–12 mm.

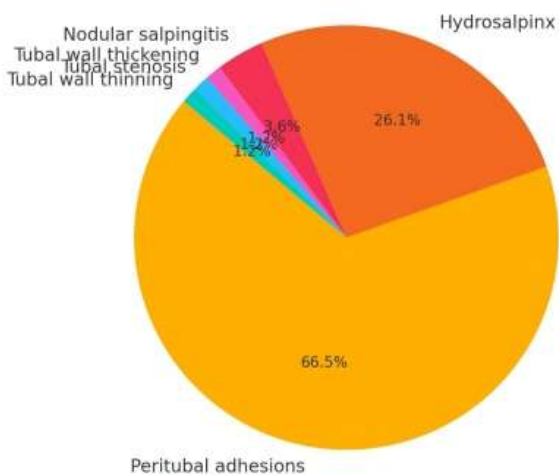
**Group 2 (Secondary infertility):** Normal ovulation (n = 13): In 3 patients, 20 mm follicles with ovulation on day 14. In 7 patients, 19 mm follicles with ovulation on day 13. In 3 patients, follicles were 18–22 mm with ovulation on days 14–15. Endometrial thickness ranged from 9 to 12 mm. Delayed ovulation (n = 27): In 10 patients, follicle size ranged from 22–25 mm with ovulation on day 16. In 17 patients, follicles measured 23–26 mm with ovulation on day 17. Endometrial thickness was 9–12 mm.

**Hysterosalpingography (HSG) findings:** Out of 80 patients, 46 showed fallopian tube occlusion. Among them: Bilateral tubal occlusion was found in 27 patients. Unilateral occlusion in 19 patients. Interstitial segment obstruction in 20 cases, isthmic segment occlusion in 2 cases, ampullary segment occlusion with hydrosalpinx formation in 24 cases.



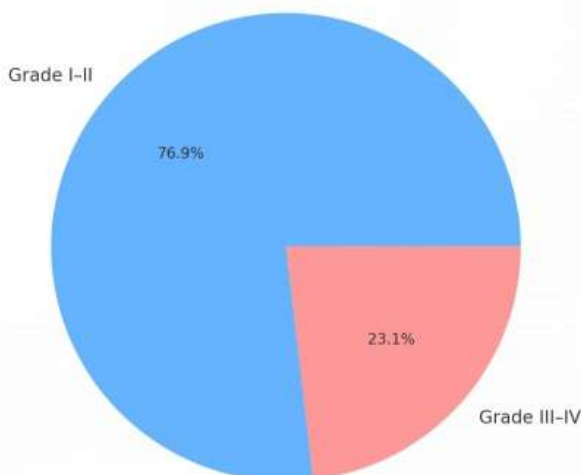
According to laparoscopy findings, the condition of the fallopian tubes was as follows: Peritubal adhesions were observed in 18 patients (70%). Hydrosalpinx was diagnosed in 22 patients (27.5%), nodular salpingitis in 3 patients (3.8%), thickening of the tubal wall in 1 patient (1.3%), tubal stenosis in 1 patient (1.3%), and thinning of the tubal wall in 1 patient (1.3%).

**Tubal Conditions (Laparoscopic Findings)**



The degree of adhesions (according to S.T. Hulka classification): Grade I–II adhesions were detected in 35 patients (53.8%), while Grade III–IV adhesions were found in 11 patients (16.2%).

**Adhesion Grades (S.T. Hulka Classification)**



Tubal occlusion: Occlusion of the interstitial portion of the fallopian tubes was observed in 20 patients (30%), and ampullary segment occlusion was present in 24 patients (70%). A discrepancy with hysterosalpingography (HSG) results was noted in 2 patients (5%).

Surgical interventions performed: Salpingoovariolysis was conducted in 32 patients (70%), salpingostomy in 7 patients (16.2%), and fimbrioplasty in 24 patients (53.8%).

The severity of pelvic adhesions significantly influences reproductive outcomes. Postoperative pregnancy rates were found to correlate with the extent of adhesions. The best pregnancy outcomes were observed after the following surgical procedures: salpingo-ovariolysis – 19 cases (61.4%), fimbrioplasty – 9 cases (39.2%), and salpingoneostomy – 2 cases (26.9%).

Using laparoscopy with chromopertubation and hysteroscopy, the following parameters were identified: the site and cause of tubal occlusion, disease severity, and in cases of proximal tubal occlusion, the type of obstruction. Based on these findings, individualized surgical approaches were selected. The severity of adhesions also had a substantial impact on the likelihood of achieving pregnancy: Grade I–II adhesions: pregnancy occurred in 59% of cases. Grade III–IV adhesions: pregnancy occurred in only 20.2% of cases. In cases with severe (Grade III–IV) adhesions, the likelihood of pregnancy remained significantly lower even after surgery.

As a result of diagnostic and therapeutic laparoscopy, a total of 33 patients achieved pregnancy. Of these, 13 patients underwent repeat diagnostic laparoscopy and re-treatment, after which 9 additional pregnancies were observed. For the remaining 4 patients, assisted reproductive technology (ART) was recommended.

Comprehensive treatment of women with infertility of inflammatory origin yielded the following outcomes: Pregnancy was observed in 29 women (50.9%) from the primary infertility group and 28 women (49.1%) from the secondary infertility group. Full-term deliveries were registered in 38 patients (66.7%), including 30 patients (52.6%) with primary infertility and 8 patients (14%) with secondary infertility. Preterm births occurred in 10 cases (17.5%): 7 (12.28%) in the primary infertility group and 3 (5.27%) in the secondary infertility group. Ectopic pregnancy was identified in 3 patients (5.25%): 1 (1.75%) with primary infertility and 2 (3.5%) with secondary infertility. Early miscarriages occurred in 2 patients (3.5%) in each group, while late miscarriages were reported in 1 patient (1.75%) in each group. In total, pregnancy was achieved in 57 patients (71.25%), while 23 patients (28.75%) remained infertile. Among those who underwent in vitro fertilization (IVF), 3 patients (3.75%) were from the primary infertility group and 6 patients (7.5%) from the secondary infertility group. The overall pregnancy rate following IVF was 11.25%.

**Discussion:** The findings underscore the importance of an integrated diagnostic approach in evaluating female infertility of inflammatory origin. Isolated clinical or imaging data often fail to capture the full spectrum of reproductive damage caused by chronic infections. The combination of PCR testing with functional imaging and laparoscopy provides a clearer picture of the disease process and allows for timely and individualized treatment. The study also demonstrates that addressing subclinical infections through targeted antimicrobial therapy, coupled with rehabilitation techniques, can significantly improve reproductive outcomes. Furthermore, timely

identification and treatment may reduce the need for assisted reproductive technologies in many cases. This research supports previous studies emphasizing the high prevalence of asymptomatic genital tract infections and their role in tubal-peritoneal infertility. The effectiveness of the proposed diagnostic and therapeutic algorithm highlights the benefit of personalized, pathogen-oriented management.

**Conclusion:** A comprehensive diagnostic and treatment strategy plays a critical role in managing inflammatory infertility

in women. Early detection using combined clinical, laboratory, instrumental, and molecular methods enhances the accuracy of diagnosis and improves treatment outcomes. The study results show that integrated rehabilitation therapy not only restores reproductive function but also increases the likelihood of natural conception. Therefore, the implementation of such an approach in clinical practice is highly recommended for improving fertility prognosis in women with inflammation related infertility.

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