Dicle Tıp Dergisi / Dicle Med J (2026) 53 (1) : 95-102

www.diclemedj.org

Original Article / Özgün Araştırma

IVF Outcomes in Women with Endometriosis: A Comparative Study with Tubal Factor Infertility

Elif Gelenli Dolanbay[1], Tugay Mert[1], Sevil Ünal[2], Aret Kamar[2]

1 Department of Histology and Embryology, Faculty of Medicine, Istanbul Medeniyet University; Istanbul, Türkiye

2 Istanbul IVF and Women's Health Center; Istanbul, Türkiye

Received: 25.11.2025; Revised: 12.02.2026; Accepted: 13.02.2026

Abstract

Objective: Endometriosis is a complex gynaecological condition associated with infertility; however, the impact of endometriosis on assisted reproductive technology (ART) outcomes remains unclear. The objective of this study was to compare the outcomes of in vitro fertilization (IVF) between women with endometriosis and those with tubal factor infertility and to evaluate whether significant differences exist between the groups in terms of fertilization rate, embryo development, and live birth rate.

Methods: The present retrospective observational study comprised 50 women diagnosed with endometriosis and 57 women with tubal factor infertility who underwent embryo transfer at a single fertility centre between 2017 and 2024. Patients with incomplete data, polycystic ovary syndrome, poor ovarian response, uterine myomas, or ovulatory factor infertility were excluded from the study. The collected variables included female and male ages, endometrial thickness, semen parameters (total sperm count and motility), total oocytes retrieved, metaphase II oocyte count, fertilization rate, embryo quality on days 2 and 3, blastocyst number, embryo transfer day, total embryos, biochemical pregnancy (hCG positivity), and live birth outcomes. The fertilization rate was calculated as the ratio of 2PN oocytes to total oocytes retrieved. Statistical analyses were performed using SPSS 20. Continuous variables were compared using Student's t-test or the Mann–Whitney U test, while categorical variables were analysed using Chi-square or Fisher's exact test. Statistical significance was defined as a p-value less than 0.05.

Results: Female and male ages, endometrial thickness, and total sperm count were comparable between the groups ($p>0.05$). No significant differences were observed in total oocyte and mature (MII) oocyte numbers, fertilization rate, day 2 and day 3 embryo quality, blastocyst count, embryo transfer day, or total number of embryos ($p>0.05$). Biochemical pregnancy and live birth rates were slightly higher in women with endometriosis compared to the control group, but these differences were not statistically significant ($p>0.05$). Sperm motility and the incidence of asthenozoospermia were also similar between the groups ($p>0.05$). These findings indicate that, in women with endometriosis, appropriate laboratory conditions and protocol implementation may minimize potential factors that could adversely affect ART outcomes.

Conclusion: A comparative analysis of assisted reproductive technology (ART) outcomes in women diagnosed with endometriosis and women with tubal factor infertility reveals no significant disparities in fertilisation, embryo development, and live birth rates. These findings suggest that, under well-controlled laboratory conditions and among relatively young patients, the adverse effects of endometriosis on ART success may be mitigated. Standardised protocols and judicious patient selection are imperative to optimise reproductive outcomes in this demographic. The present study demonstrates that the success of assisted reproductive technology (ART) in women with endometriosis can reach levels comparable to those with tubal factor infertility, thus providing a promising perspective for clinical practice.

Keywords: Endometriosis, Infertility, Assisted Reproductive Techniques, In Vitro Fertilization, Embryo Transfer

DOI: 10.5798/dicletip.1906455

Correspondence / Yazışma Adresi: *Elif Gelenli Dolanbay, Department of Histology and Embryology, Faculty of Medicine, Istanbul Medeniyet University, Unalan Neighborhood, Unalan Street, D-100 Highway Side Road, 34700 Uskudar, Istanbul, Türkiye; Email: elif.dolanbay@medeniyet.edu.tr, egelenli@gmail.com*

Endometriozisli Kadınlarda IVF Sonuçları: Tübal Faktör İnfertilitesi ile Karşılaştırmalı Bir Çalışma

Öz

Amaç: Endometriozis, infertilite ile ilişkili karmaşık bir jinekolojik durumdur, ancak endometriozisin yardımcı üreme teknolojisi (YÜT) sonuçları üzerindeki etkisi hala belirsizdir. Bu çalışma, endometriozisli kadınlar ile tübal faktör infertilitesi olan kadınlar arasında in vitro fertilizasyon (IVF) sonuçlarını karşılaştırmayı ve iki grup arasında fertilizasyon oranı, embriyo gelişimi ve canlı doğum oranları açısından anlamlı farklılık olup olmadığını değerlendirmeyi hedeflemiştir.

Yöntemler: Bu retrospektif gözlemsel çalışma, 2017 ile 2024 yılları arasında tek bir tüp bebek merkezinde embriyo transferi yapılan, endometriozis tanısı konmuş 50 kadın ve tübal faktör infertilitesi olan 57 kadını içermektedir. Verileri eksik olan, polikistik over sendromu, zayıf over yanıtı, uterus miyomları veya ovulatuar faktör infertilitesi olan hastalar çalışma dışında tutulmuştur. İncelenen değişkenler; kadın ve erkek yaşları, endometrial kalınlık, semen parametreleri (toplam sperm sayısı ve hareketliliği), elde edilen toplam oosit sayısı, metafaz II oosit sayısı, döllenme oranı, 2. ve 3. günlerdeki embriyo kalitesi, blastokist sayısı, embriyo transfer günü, toplam embriyo sayısı, biyokimyasal gebelik (hCG pozitifliği) ve canlı doğum sonuçlarıdır. Döllenme oranı, 2PN oositlerin toplam elde edilen oositlere oranı olarak hesaplandı. İstatistiksel analizler SPSS 20 kullanılarak yapıldı. Sürekli değişkenler Student's t-testi veya Mann-Whitney U testi ile karşılaştırılırken, kategorik değişkenler Ki-kare veya Fisher'in kesin testi kullanılarak analiz edilmiştir. p-değeri <0,05 istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular: Kadın ve erkek yaşları, endometriyal kalınlık ve toplam sperm sayısı gruplar arasında benzerdi (p>0,05). Toplam oosit ve olgun (MII) oosit sayısı, fertilizasyon oranı, 2. ve 3. gün embriyo kalitesi, blastokist sayısı, embriyo transfer günü ve toplam embriyo sayısında gruplar arasında anlamlı fark gözlenmedi (p>0,05). Biyokimyasal gebelik ve canlı doğum oranları endometriozisli kadınlarda kontrol grubuna kıyasla biraz daha yüksek olmasına rağmen, fark istatistiksel olarak anlamlı değildi (p>0,05). Sperm motilitesi ve astenozoospermi insidansı da gruplar arasında farklılık göstermedi (p>0,05). Bulgular, endometriozisli kadınlarda uygun laboratuvar koşulları ve protokol uygulamalarının, YÜT başarısını olumsuz etkileyebilecek potansiyel faktörleri en aza indirebileceğini göstermektedir.

Sonuç: Endometriozis tanısı bulunan kadınların YÜT sonuçları, tübal faktör infertilitesi olan kadınlarla karşılaştırıldığında döllenme, embriyo gelişimi ve canlı doğum oranları yönünden benzerlik göstermiştir. Bu sonuçlar, iyi kontrol edilen laboratuvar ortamı ve nispeten genç hasta grubunda, endometriozisin YÜT başarısı üzerindeki olumsuz etkilerinin hafifletilebileceğini göstermektedir. Standartlaştırılmış protokoller ve özenli hasta seçimi, bu popülasyonda üreme sonuçlarını iyileştirmek için kritik öneme sahiptir. Bu çalışma, endometriozisli kadınlarda YÜT başarısının tübal faktör infertilitesi ile eşdeğer seviyelere ulaşabileceğini ortaya koyarak, klinik uygulamalara umut verici bir perspektif sunmaktadır.

Anahtar kelimeler: Endometriozis, İnfertilite, Yardımcı Üreme Teknikleri, İn Vitro Fertilizasyon, Embriyo Transferi.

INTRODUCTION

Endometriosis is a chronic inflammatory disease characterized by the presence of endometrial glands and stroma outside the uterine cavity. It is estimated to affect approximately 176 million women worldwide[1]. Despite the fact that the precise pathophysiology of endometriosis remains to be fully elucidated, a number of theories have been postulated. The most widely accepted hypothesis suggests that lesions result from retrograde menstruation, during which endometrial cells are transported into the pelvic cavity; additionally, coelomic metaplasia, lymphatic or vascular dissemination, and immunogenetic predisposition may also contribute to disease development[2]. The symptoms experienced by women afflicted with endometriosis are diverse and include, but are not limited to, dysmenorrhea, dyspareunia, menorrhagia, non-cyclic pelvic pain, ovulation pain, dysuria, and chronic fatigue. Whilst clinical signs and physical examination findings may provide diagnostic guidance, the gold standard for diagnosis remains laparoscopic visualization of lesions, preferably supported by histological confirmation[3].

Endometriosis is frequently associated with infertility. The aetiology of this relationship has been elucidated by various mechanisms, including impaired tubo-ovarian function, the presence of ovarian endometriomas, subclinical pelvic inflammation, reduced oocyte quality, and decreased endometrial receptivity[4]. The prevalence of the disease has been documented as affecting approximately 10% of women of reproductive age and 25–40% of women experiencing infertility[5]. The aetiology of endometriosis-associated infertility is most

likely chronic pelvic inflammation. This inflammation is associated with elevated cytokine and macrophage levels in the peritoneal fluid and can adversely affect human reproduction[6]. Persistent inflammation may lead to the formation of adhesions and scar tissue within the pelvic region, resulting in the disruption of anatomical structures and potentially leading to tubal obstruction or deformation. Impaired ovarian function and hindered oocyte release or transport may also occur, collectively contributing to a reduction in fertility[7].

In fertile couples, the probability of achieving a live birth in a given month is approximately 15–20%. In contrast, untreated women with endometriosis exhibit a significantly diminished monthly fertility rate, ranging from 2–10%[8,9]. Furthermore, studies have reported that the three-year cumulative pregnancy rate in women with endometriosis is significantly lower than in the control group (36% vs. 54%), and that pregnancy rates are reduced even in donor insemination studies where male and coital factors are controlled. These findings underscore the strong association between endometriosis and reduced fertility[10]. The findings from in vitro fertilization (IVF) cycles suggest that reproductive outcomes are particularly poor in cases of advanced-stage endometriosis. A number of factors have been identified as contributing to the issue, including impaired sperm-oocyte interaction, diminished ovarian reserve, reduced oocyte and embryo quality, decreased endometrial receptivity, implantation defects, and luteinized unruptured follicle syndrome[11,12]. Nevertheless, the extant literature remains inconsistent. A number of studies have reported a reduction in preovulatory follicle counts, a decline in the number of embryo transfers, and an increase in miscarriage rates in women diagnosed with endometriosis. Conversely, other studies have observed no significant differences in fertility outcomes when compared to control groups[13,14]. Some investigations even suggest that IVF success rates in women with endometriosis are comparable to those in patients with unexplained infertility or tubal factor infertility[15,16].

Endometriosis-associated infertility cannot be explained solely by the presence of endometriotic lesions; rather, it results from a complex interplay of multiple factors, including the anatomical integrity of pelvic organs, hormonal balance, immune responses, and sexual function. In this context, the present study retrospectively evaluated assisted reproductive technology (ART) outcomes in patients with endometriosis who presented to a specialized IVF center, compared with those diagnosed with tubal factor infertility.

METHODS

Study Design and Setting

This retrospective observational study examined female patients presenting with infertility at a tertiary in vitro fertilization and women's health center between 2017 and 2024. It aimed to compare the outcomes of ART between patients diagnosed with endometriosis and those with tubal factor infertility. This study was approved by the local Non-Interventional Clinical Research Ethics Committee (Approval Date: 06.11.2025; Decision No: 2025/0277). All procedures were performed in accordance with the ethical standards of the local ethics committee and the principles outlined in the Declaration of Helsinki.

Initially, infertile women presenting to the IVF center between 2017 and 2024 were screened. A total of 50 patients diagnosed with endometriosis and 57 patients diagnosed with tubal factor infertility who met the inclusion criteria were included in the study.

Inclusion and Exclusion Criteria

Women included in the study were those presenting to the IVF center between 2017 and 2024 with infertility. They had undergone embryo transfer and were diagnosed with either endometriosis (confirmed by laparoscopy and histopathology) or tubal factor infertility. Only patients with complete clinical and laboratory records were considered. Patients were excluded if they had incomplete records, did not undergo embryo transfer, had polycystic ovary syndrome (PCOS), had uterine myomas, or had infertility due to ovulatory factors.

Ovulation Induction Protocols

Controlled ovarian hyperstimulation was performed using a GnRH antagonist protocol. Gonadotropin therapy was initiated with individualized doses based on patient age and ovarian reserve. When adequate follicular development was achieved, ovulation was triggered with 250 µg recombinant hCG (Ovitrelle®), and oocyte retrieval was performed 34–36 hours later.

Data Collection and Variables

Demographic and clinical data were obtained from patient records, including patient age, partner age, endometrial thickness, semen parameters of partners (total sperm count and motility), total number of oocytes retrieved, and number of mature (MII) oocytes. Fertilization rate was calculated as the ratio of total 2PN oocytes to total oocytes retrieved, as the total number of oocytes subjected to intracytoplasmic sperm injection (ICSI) was unavailable. Live birth rate was calculated among pregnancies with positive hCG. Embryo quality on day 3 was assessed according to Hardarson et al. (2001) criteria, focusing on the proportion of Grade 1 embryos[17]. Additional embryological parameters included the total number of blastocysts, day of embryo transfer, and the total number of embryos transferred. Clinical outcomes evaluated were a positive hCG test and live birth.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 20. Data distribution was assessed using the Shapiro–Wilk test. Continuous variables were presented as mean ± standard error or median (interquartile range), while categorical variables were presented as frequencies and percentages. Group comparisons for continuous variables were performed using the independent samples t-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data. Categorical variables were compared using the Chi-square test or Fisher's exact test when appropriate. Holm–Bonferroni correction was applied to adjust for multiple comparisons and reduce Type I error. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 107 women were included in the study, comprising 57 with tubal factor infertility (control group) and 50 with endometriosis. Baseline characteristics, semen parameters, oocyte retrieval outcomes, and embryological results are summarized in Table I.

Demographic and baseline characteristics: There was no significant difference in female age between the control and endometriosis groups (33.75 ± 0.56 vs. 32.81 ± 0.55 years, p = 0.124). Male age was higher in the control group (37.15 ± 0.87 vs. 34.77 ± 0.61 years, p = 0.024), but this difference was not statistically significant after Holm–Bonferroni correction (p = 0.36). Endometrial thickness was similar between the groups (10.42 ± 0.36 mm vs. 10.13 ± 0.34 mm, p = 0.698).

Semen parameters: No significant differences were observed in total sperm count (40.54 ± 3.88 million vs. 34.86 ± 3.89 million, p = 0.272)

or in the proportion of patients with asthenozoospermia (42.1% vs. 34%, p = 0.390).

Oocyte retrieval outcomes: The total number of oocytes retrieved (6.92 ± 0.64 vs. 5.75 ± 0.50, p = 0.213) and MII oocytes (4.75 ± 0.45 vs. 4.17 ± 0.33, p = 0.561) were comparable between the groups.

Fertilization and embryo quality: Fertilization rates were similar (57.87 ± 3.23% vs. 63.22 ± 3.39%, p = 0.241). The proportion of grade 1 embryos on day 2 (11.05 ± 3.42% vs. 13.61 ± 3.35%, p = 0.165) and day 3 (10.18 ± 3.45% vs. 11.26 ± 3.22%, p = 0.423) did not differ significantly.

Embryo transfer and blastocyst outcomes: The number of blastocysts per cycle was higher in the control group (1.87 ± 0.37 vs. 1.04 ± 0.28, p = 0.149), though not statistically significant. There were no significant differences in embryo transfer day (3.77 ± 0.12 vs. 3.48 ± 0.13, p = 0.147) or total number of embryos per cycle (2.98 ± 0.24 vs. 2.31 ± 0.21, p = 0.056).

Pregnancy outcomes: The rates of hCG positivity (42.1% vs. 48%, p = 0.541) and live birth (50% vs. 70.8%, p = 0.140) were not significantly different between the two groups.

Overall, there were no statistically significant differences in reproductive outcomes between the control and endometriosis groups, although a trend toward higher live birth rates was observed in the endometriosis group.

Table I: Comparison of Clinical, Laboratory, and Embryological Parameters Between the Endometriosis and Tubal Factor Infertility Groups

Parameter	Tubal Factor	Endometriosis	p-value	Adjusted p-value (Holm–Bonferroni)
Female age (years, mean ± SE)	33.75 ± 0.56	32.81 ± 0.55	0.124	–
Male age (years, mean ± SE)	37.15 ± 0.87	34.77 ± 0.61	0.024	0.36
Endometrial thickness (mm, mean ± SE)	10.42 ± 0.36	10.13 ± 0.34	0.698	–
Total sperm count (million, mean ± SE)	40.54 ± 3.88	34.86 ± 3.89	0.272	–
Sperm motility (asthenozoospermia, %)	42.1	34.0	0.390	–
Total oocytes retrieved (mean ± SE)	6.92 ± 0.64	5.75 ± 0.50	0.213	–
MII oocytes (mean ± SE)	4.75 ± 0.45	4.17 ± 0.33	0.561	–
Fertilization rate (% ± SE)	57.87 ± 3.23	63.22 ± 3.39	0.241	–
Day 2 Grade 1 embryos (% ± SE)	11.05 ± 3.42	13.61 ± 3.35	0.165	–
Day 3 Grade 1 embryos (% ± SE)	10.18 ± 3.45	11.26 ± 3.22	0.423	–
Total embryos (mean ± SE)	2.98 ± 0.24	2.31 ± 0.21	0.056	–
Blastocysts (mean ± SE)	1.87 ± 0.37	1.04 ± 0.28	0.149	–
Embryo transfer day (mean ± SE)	3.77 ± 0.12	3.48 ± 0.13	0.147	–
hCG positivity (%)	42.1	48.0	0.541	–
Live birth rate (%)	50.0	70.8	0.140	–

p < 0.05 was considered statistically significant. Adjusted p-values were calculated using the Holm–Bonferroni method.

DISCUSSION

Endometriosis is a complex and systemic clinical syndrome characterized by chronic inflammation and hormonal imbalance, which can negatively affect women's reproductive health and overall quality of life. Despite the well-established clinical link between endometriosis and infertility, the underlying

mechanisms that underpin endometriosis-associated infertility remain to be fully elucidated. The current understanding suggests a multifactorial nature to these mechanisms[18]. In this retrospective observational study, we compared ART outcomes between women diagnosed with endometriosis and those with tubal factor infertility but without endometriosis. Our findings revealed no statistically significant differences between the two groups in terms of oocyte yield, fertilization rate, embryo quality, hCG positivity, or live birth rate.

Similarly, a retrospective matched cohort study conducted by Invernici et al. (2022) compared 248 women with endometriosis to 248 matched controls and demonstrated that the number of oocytes retrieved was significantly lower in the endometriosis group. However, embryo quality, clinical pregnancy rate, and live birth rate were comparable between the groups [19]. In a further extensive retrospective cohort study, Sanchez et al. (2020) analysed 429 ART cycles from women with endometriosis and 851 cycles from women without the disease. Despite the fact that semen parameters (sperm count and motility) were found to be significantly better in partners of women with endometriosis, no significant differences were observed in fertilisation rate or embryo number[20]. In accordance with the aforementioned findings, the control group demonstrated a marginally elevated sperm count, yet concurrently exhibited a higher incidence of asthenozoospermia. However, the fertilisation rate, embryo count, and embryo quality were comparable between the two groups.

These results suggest that differences in sperm concentration and motility do not necessarily translate into improved fertilization or embryo development outcomes. In vitro, oocyte quality and laboratory techniques may have a greater impact on fertilization success than the male factor itself. The use of ICSI likely minimizes the influence of sperm motility and morphology, which could explain the comparable outcomes between groups. Taken together, both our study and previous reports imply that under well-controlled laboratory conditions, potential variations in oocyte quality may not significantly affect ART success.

Supporting these observations, González-Comadran et al. (2017) conducted a large systematic review and meta-analysis including 3,583 women with endometriosis and 18,833 controls and reported comparable clinical pregnancy and live birth rates between the groups. Although clinical pregnancy and live birth rates were slightly higher in the endometriosis group (24.31% and 23.81%) compared with controls (23.76% and 23.35%), the differences were not statistically significant. Interestingly, among women under 35 years of age, the clinical pregnancy rate was significantly higher in the endometriosis group (30.14% vs. 27.52%, p=0.04)[21]. In parallel, our study showed that the endometriosis group had higher clinical pregnancy (48%) and live birth rates (70.8%) than the control group (42.1% and 50%, respectively), although the differences did not reach statistical significance. The relatively young age of participants in both groups (33.75 vs. 32.81 years) may partially explain these findings. As reported in previous literature, younger women with endometriosis may have preserved ovarian reserve and oocyte quality, which could contribute to similar or even slightly better reproductive outcomes compared to controls.

Finally, the comparable endometrial thickness and embryo transfer timing between groups in our study indicate that the IVF center maintained standardized ART protocols across patients, minimizing the likelihood that procedural variations influenced the results.

Overall, these findings suggest that the negative impact of endometriosis on ART outcomes may not be universal. In well-controlled laboratory

settings and among younger women, satisfactory ART results can be achieved in patients with endometriosis, highlighting the importance of individualized treatment planning and standardized clinical protocols.

Future Research and Clinical Recommendations

This study demonstrates that ART outcomes in women with endometriosis are comparable to those with tubal factor infertility; however, the findings are limited by the retrospective, single-center design. Future prospective, multicenter studies with larger cohorts are warranted to elucidate the impact of disease stage, presence of endometriomas, ovarian reserve, and associated comorbidities on ART outcomes. Clinically, individualized ovarian stimulation protocols, standardized laboratory procedures, and meticulous embryo assessment remain critical to maximizing success rates. Furthermore, providing patients with realistic, evidence-based expectations can enhance treatment satisfaction and foster informed decision-making.

CONCLUSION

This retrospective observational study demonstrated that women with endometriosis and those with tubal factor infertility achieved comparable ART outcomes, including oocyte yield, fertilization rate, embryo quality, biochemical pregnancy, and live birth rates. Although a trend toward higher clinical pregnancy and live birth rates was observed in the endometriosis group, these differences were not statistically significant, suggesting that under well-controlled laboratory conditions and in relatively young patients, the traditionally presumed adverse effects of endometriosis may be mitigated.

These findings highlight the multifactorial nature of endometriosis-associated infertility, emphasizing that impaired reproductive outcomes cannot be attributed solely to the presence of endometriotic lesions. A complex interplay of anatomical, hormonal, immunological, and possibly sexual function-related factors likely contributes to ART success. Accordingly, meticulous patient selection, individualized ovarian stimulation protocols, rigorous laboratory practices, and careful embryo evaluation remain critical to optimizing reproductive outcomes in this patient population.

Furthermore, these results underscore the importance of nuanced patient counseling, enabling clinicians to provide realistic expectations while acknowledging the potential for favorable ART outcomes in women with endometriosis. Given the inherent limitations of retrospective, single-center analyses, including modest sample size and potential selection biases, future prospective, multicenter studies with larger cohorts are warranted. Such studies could further elucidate subtle biological and clinical determinants of ART success in endometriosis, including disease stage, ovarian reserve, presence of endometriomas, and associated comorbidities, ultimately guiding evidence-based, personalized treatment strategies and improving reproductive prognosis in this challenging patient population.

Ethical Approval: This study was approved by the local Non-Interventional Clinical Research Ethics Committee (Approval Date: 06.11.2025; Decision No: 2025/0277). All procedures were performed in accordance with the ethical standards of the local ethics committee and the principles outlined in the Declaration of Helsinki.

Conflict of Interest: The authors declared no conflicts of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Adamson GD, Kennedy S, Hummelshoj L. Creating Solutions in Endometriosis: Global Collaboration

through the World Endometriosis Research Foundation. J Endometr. 2010;2(1):3-6.

2. Johnson NP, Hummelshoj L, Abrao MS, et al. Consensus on current management of endometriosis. Human Reproduction. 2013;28(6):1552-68.

3. Kennedy S, Bergqvist A, Chapron C, et al. ESHRE guideline for the diagnosis and treatment of endometriosis. Human Reproduction. 2005;20(10):2698-704.

4. Lessey BA. Assessment of endometrial receptivity. Fertil Steril. 2011;96(3):522-9.

5. Ozkan S, Murk W, Arici A. Endometriosis and infertility: epidemiology and evidence-based treatments. Ann N Y Acad Sci. 2008;1127(1):92-100.

6. Mappa I, Page ZP, Di Mascio D, et al. The Effect of Endometriosis on In Vitro Fertilization Outcomes: A Systematic Review and Meta-Analysis. Healthcare. 2024;12(23):2435.

7. Coccia ME, Nardone L, Rizzello F. Endometriosis and Infertility: A Long-Life Approach to Preserve Reproductive Integrity. Int J Environ Res Public Health. 2022;19(10):6162.

8. The Practice Committee of the American Society for Reproductive Medicine. Endometriosis and infertility. Fertil Steril. 2004;81(5):1441-6.

9. Hughes E, Brown J, Collins JJ, et al. Ovulation suppression for endometriosis for women with subfertility. Cochrane Database Syst Rev. 2007;2007(3):CD000155.

10. Akande VA. Differences in time to natural conception between women with unexplained infertility and infertile women with minor endometriosis. Human Reproduction. 2004;19(1):96-103.

11. Azem F, Lessing JB, Geva E, et al. Patients with stages III and IV endometriosis have a poorer outcome of in vitro fertilization–embryo transfer than patients with tubal infertility. Fertil Steril. 1999;72(6):1107-9.

12. Lessey BA. Implantation Defects in Infertile Women with Endometriosis. Ann N Y Acad Sci. 2002;955(1):265-80.

13. Al-Azemi M, Bernal AL, Steele J, et al. Ovarian response to repeated controlled stimulation in in-vitro fertilization cycles in patients with ovarian endometriosis. Human Reproduction. 2000;15(1):72-5.

14. Yanushpolsky EH, Best CL, Jackson KV, et al. Effects of Endometriomas on Oocyte Quality, Embryo Quality, and Pregnancy Rates in In Vitro Fertilization Cycles: A Prospective, Case-Controlled Study. J Assist Reprod Genet. 1998;15(4):193-7.

15. Kodama H, Fukuda J, Karube H, et al. Benefit of in vitro fertilization treatment for endometriosis-associated infertility. Fertil Steril. 1996;66(6):974-9.

16. Tinkanen H, Kujansuu E. In vitro fertilization in patients with ovarian endometriomas. Acta Obstet Gynecol Scand. 2000;79(2):119-22.

17. Hardarson T, Hanson C, Sjögren A, et al. Human embryos with unevenly sized blastomeres have lower pregnancy and implantation rates: indications for aneuploidy and multinucleation. Human Reproduction. 2001;16(2):313-8.

18. Bonavina G, Taylor HS. Endometriosis-associated infertility: From pathophysiology to tailored treatment. Front Endocrinol (Lausanne). 2022;13.

19. Invernici D, Reschini M, Benaglia L, et al. The impact of endometriosis on IVF efficacy: qualitative and quantitative assessment of ovarian response and embryo development. Reprod Biomed Online. 2022;45(2):275-81.

20. Sanchez AM, Pagliardini L, Cermisoni GC, et al. Does Endometriosis Influence the Embryo Quality and/or Development? Insights from a Large Retrospective Matched Cohort Study. Diagnostics. 2020;10(2):83.

21. González-Comadran M, Schwarze JE, Zegers-Hochschild F, et al. The impact of endometriosis on the outcome of Assisted Reproductive Technology. Reproductive Biology and Endocrinology. 2017;15(1):8.