Fertility After Unilateral Oophorectomy: A Review of Assisted Reproductive Technology Outcomes

Dzotsenidze S.[1], Pkhaladze L.[2], Kristesashvili J.[1], Samer H.[3]

Abstract

Background: Unilateral oophorectomy (UO), the surgical removal of one ovary, remains a necessary intervention for various gynecologic conditions despite a general trend toward more conservative treatments. As increasing numbers of women with a single ovary participate in assisted reproductive technology (ART) programs, understanding the impact of UO on fertility outcomes is essential. Though ovarian reserve may be diminished, compensatory mechanisms may preserve reproductive potential. Clarifying this relationship can inform patient counseling and treatment planning.
Aim: To evaluate whether unilateral oophorectomy significantly affects outcomes in assisted reproductive technologies (ART), particularly in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), through a systematic review of the literature.
Methods: A literature review was conducted using PubMed and Google Scholar databases. The search included articles published in English from January 1987 to December 2024 using the keywords "unilateral oophorectomy" and "assisted reproduction." After removing duplicates and studies that did not meet inclusion criteria, 9 articles were included in the final analysis. These studies varied in design (prospective, retrospective, cohort studies, and systematic reviews) and sample size, but all focused on ART outcomes in women with one ovary compared to those with two.
Results:The selected studies demonstrated that women with a single ovary generally have a reduced ovarian response, including fewer follicles, lower peak estradiol levels, and fewer retrieved oocytes. However, in most studies, clinical pregnancy and live birth rates remained comparable to those of women with two ovaries. Some studies even reported higher pregnancy rates in the UO group. Evidence of compensatory ovarian function in the remaining ovary was observed, including increased antral follicle count and follicular yield. Differences in ovarian stimulation protocols and patient characteristics influenced the magnitude of response, but ART success rates were not significantly compromised overall.
Conclusions: Despite reduced ovarian reserve and response in women with unilateral oophorectomy, ART outcomes—including pregnancy and live birth rates—are largely comparable to those in women with two ovaries. This suggests that the remaining ovary may compensate functionally, supporting satisfactory reproductive outcomes. Women who have undergone UO can be counseled with confidence regarding their fertility potential with ART. Further research is warranted to explore mechanisms of ovarian compensation and optimize treatment protocols for this population. **(TCM-GMJ August 2025; 10 (2): P40-P46)**

Keywords: Fertility, reproductive health, assisted reproduction, unilateral oophorectomy

Introduction

As gynecology increasingly embraces conservative management strategies for ovarian pathologies, clinicians are recognizing the diminishing necessity for oophorectomy, whether unilateral or bilateral (1). The data clearly shows that the incidence of oophorectomy procedures in developed countries has consistently declined since 2005 (1). Nonetheless, unilateral oophorectomy remains a vital and clinically appropriate intervention for certain medical conditions. Healthcare providers must effectively assess the potential impact of unilateral oophorectomy on fertility outcomes, including the likelihood of conception and successful pregnancy through in vitro fertilization (IVF) or other assisted reproductive technologies (ART) (2). The decision to perform an oophorectomy is determined by the patient's clinical presentation and specific pathology. This procedure can be executed through laparoscopy, vaginal approach, or laparotomy, and is indicated for both preventive and therapeutic purposes in cases such as ovarian cysts, endometriosis, ovarian torsion, or tubo-ovarian abscesses. Additionally, prophylactic oophorectomy is a necessary consideration for individuals at high risk of ovarian cancer. In such instances, the procedure may be performed concurrently with a scheduled hysterectomy or as a standalone surgical intervention (1). A considera-

From the [1]Ivane Javakhishvili Tbilisi State University, Georgia; [2]Archil Khomasuridze Institute of Reproductology, Georgia; [3]University Hospital Sharjah, Sharjah, UAE
Received July 1, 2025; accepted July 20 , 2025.
Address requests to: Dzotsenidze Stela
E-mail: dzotsenidze.stella@mail.ru

ble proportion of women with just one functioning ovary participate in assisted reproductive technology programs.

Thus, it is essential to comprehend how unilateral oophorectomy affects the outcomes of these treatments. Gaining this understanding is vital for optimizing assisted reproductive technology and enhancing clinical practices to better support these women on their journey to parenthood.

This study performs a review of the scientific literature to determine if unilateral oophorectomy significantly impacts the outcomes of assisted reproductive technologies (ART).

Methods

Electronic searches were conducted using the PubMed and Google Scholar databases. The results were restricted to articles published between January 1987 and December 2024. We used the search terms "unilateral oophorectomy" and "assisted reproduction." Additionally, the search was limited to articles available in the English language

Results and discussion

Total 25 articles have been identified. After screening 15 articles has been excluded because they did not refer to our research questions, one article was removed because no full text was available. Remaining 9 articles have been reviewed in full and analyzed (Fig. 1).

One of the earliest studies addressing our research question was found to be published in 1987 by C Boutteville and colleagues (4). The research aimed to assess the results of in vitro fertilization (IVF) in women experiencing infertility due to tubal factor, comparing results in women with one ovary to the outcomes in women with both ovaries.

. A total of 415 patients with both ovaries underwent 788 IVF cycles, while 86 patients with a single ovary underwent 162 cycles. All women were stimulated by means of gonadotropins beginning on day 3 of their menstrual cycle to promote multiple follicular development.

The analysis revealed that in average, significantly higher number of preovulatory oocytes retrieved per laparoscopy and per embryo transfer can be achieved in patients with two ovaries compared to those with a single ovary. Specifically, the mean number of preovulatory oocytes retrieved per procedure was 2.33 in the two-ovary group versus 1.67 in the one-ovary group. Similarly, the number of oocytes per embryo transfer was 2.28 in patients with two ovaries, compared to 1.99 in those with a single ovary. Despite these differences in oocyte yield, the pregnancy rates counted per embryo transfer remained nearly identical between study and control groups, with a success rate of 24.4% in patients with two ovaries and 23.9% in those with a single ovary.

Further stratification of the results based on different ovarian stimulation protocols and age groups provided additional insights into the reproductive potential of women with one ovary. The findings suggest that while women with a single ovary may produce fewer fertilizable oocytes compared to those with two ovaries, their overall probability of achieving pregnancy through IVF remains comparable. These results underscore the capacity of the remaining ovary to compensate for the loss of the other, reinforcing the notion that women after unilateral oophorectomy can achieve successful in vitro fertilization results similar to the women with both intact ovaries. Consequently, patients with one ovary after ovarectomy can be counseled with confidence regarding their reproductive prospects in assisted conception.

The purpose of the study performed by E Levitas and colleagues was to compare ovarian response and pregnancy outcomes in women after unilateral oophorectomy versus the women with two ovaries undergoing IVF and embryo transfer (ET) (5). A total of 20 IVF IVF/ET cycles were performed in 10 women after unilater oophorectomy, while 60 cycles were conducted in 47 women without surgery. Each participant woman was age-matched and treated for mechanical infertility.

The treatment for both groups was consisting from combination of gonadotropin-releasing hormone (GnRH), human menopausal gonadotropin (hMG), and human chorionic gonadotropin (hCG) for ovarian stimulation and ovulation induction. In terms of ovarian response no statistically significant differences have been demonstrated between the study and control groups. The effective daily dose of gonadotropins, average serum 17β-estradiol levels on the day of hCG administration, the number of retrieved oocytes, and the number of embryos transferred per cycle were all comparable. Specifically, the daily gonadotropin dose was 3.7 ± 0.7 for women with one ovary and 3.6 ± 1.0 for those with two ovaries. The mean estradiol levels were 1136 ± 467 in women with one ovary and 1343 ± 776 in those with two ovaries. The average number of retrieved oocytes was 6.4 ± 3.7 for individuals with one ovary and 8.3 ± 4.2 for those with two ovaries. Additionally, the average number of embryos transferred per cycle was 3.0 ± 0.7 for women with one ovary and 2.9 ± 1.2 for those with two ovaries. Despite the similarities in ovarian response, the pregnancy rates differed significantly between the two groups. Women with a single ovary achieved a pregnancy rate of 52.9%, which was considerably higher than the 20.8% pregnancy rate observed in women with two ovaries. This difference remained statistically significant, with a P-value of 0.015. Statistical analysis indicated an odds ratio of 5.73 for women with one ovary, suggesting that they were more likely to conceive than those with two ovaries. The findings of this study suggest that while women with a single ovary may produce fewer oocytes compared to those with two ovaries, their chances of achieving pregnancy are higher. This unexpected outcome warrants further investigation into potential underlying mechanisms, such as compensatory ovarian function or other factors that might contribute to the higher pregnancy rates observed in women with a single ovary. These results provide reassurance that women with one ovary undergoing IVF/ET treatment can expect outcomes that are comparable to, or even better than, those of women with two ovaries.

The objective of the study by Levi and colleagues was to assess the follicular response to ovulation induction and clinical pregnancy rates in women with one ovary and

compare it to the results of the same intervention in women with two ovaries undergoing assisted reproductive technology (ART) (6). To evaluate the outcomes, in test group (in women with one ovary) were performed 46 treatment cycles and they were compared to 123 cycles preformed in control group (women with two ovaries). The average age of patients varied slightly between the groups, with the one-ovary group having a mean age of 34.4 ± 3.8 years, while in the two-ovary group mean age amounted 33.1 ± 4.0 years. Women in the single-ovary group consistently demonstrated higher baseline follicle-stimulating hormone (FSH) levels and necessitated a greater number of gonadotropin ampoules for ovulation induction.

Additionally, the time needed for induction was longer in the single-ovary group than in two-ovary group. Despite these differences, the overall ART outcomes between the two groups were similar. On the day when human chorionic gonadotropin (hCG) was administered, the maximum estradiol (E2) levels were significantly lower in the single-ovary group. However, the endometrial thickness was comparable between both groups. Furthermore, women with two ovaries had a significantly higher number of both mature and immature oocytes retrieved, as well as a greater number of embryos transferred. Despite these differences in ovarian response, the pregnancy rates were markedly higher in the two-ovary group, more than doubling those observed in the one-ovary group. The study's results suggest that although women with a single ovary may have a lower ovarian reserve and require more intensive induction protocols, their potential for achieving successful outcomes in ART is not significantly compromised. While women with two ovaries may show a slightly higher ovarian response and a greater number of embryos transferred, the difference in pregnancy rates highlights the importance of individual patient factors in determining IVF success. Women with one ovary can be reassured that they still posse the ability to achieve a successful pregnancy through in vitro fertilization.

In 2003, Safaa Al-Hasani and colleagues published a study evaluating the outcomes of ICSI treatments in individuals after unilateral oophorectomy in comparison to those with two ovaries (7). This study is the first to specifically analyze ICSI outcomes in women with only one ovary. The researchers compared 63 ICSI cycles from 24 persons in test group (single-ovary group) to 191 cycles performed in control group consisting of 109 individuals with both ovaries. In each case the triptorelin-long stimulation protocol was used. Key reproductive parameters—including ovarian response to stimulation, oocyte retrieval, and fertilization outcomes—were assessed. The results revealed significant differences in test and control groups. In test group higher total dose of gonadotropins was required (63.22 ± 45.03 units versus 44.72 ± 21.92 units) and displayed a lower ovarian response, characterized by fewer follicles (8.29 ± 5.02 versus 14.45 ± 7.94) and lower peak estradiol levels (1695.05 ± 1177.34 versus 2728.51 ± 1852.67). Additionally, the number of retrieved metaphase II oocytes was lower in the single-ovary group (6.95 ± 3.78 versus 11.72 ± 6.11), as was the number of two-pronuclear (2PN) oocytes (4.07 ± 2.85 versus 6.53 ± 4.14). However, statistically significant differences in ovarian stimulation duration, the number of embryos transferred, or the cumulative embryo score were not demonstrated.

Despite the reduced ovarian response, pregnancy rates remained comparable in test and control groups. In the single-ovary cohort, 14 pregnancies were achieved, resulting in a rate of 22.2%, while the two-ovary group had 33 pregnancies, corresponding to a rate of 17.28%. These findings suggest that although individuals after unilateral oophorectomy exhibit a diminished reaction to controlled ovarian stimulation, their overall reproductive potential following ICSI remains satisfactory. As a result, patients with a single ovary can be reassured that their likelihood of achieving pregnancy through ICSI or in vitro fertilization (IVF) is generally comparable to that of patients with two ovaries.

In 2010 Hendricks and colleagues published the which aimed to compare the ovarian response and pregnancy rates between women with one ovary and those with two ovaries undergoing assisted reproduction (8). In their study, they made a group of 18 women with a one ovary, who underwent in total 22 treatment cycles. In the control group researchers distributed 44 women with both ovaries who had mechanical infertility. These women were frequency matched, ensuring that their age and racial distribution were comparable to those of the test group. Treatment protocol in both groups consisted of controlled ovarian hyper stimulation with the method of the long down-regulation using a gonadotropin-releasing hormone agonist. The support of luteal phase after oocyte retrieval was performed using progesterone or Pregnyl. Findings of the study revealed significant differences in ovarian response in test and control groups. Women in test group required a longer duration of stimulation (11.3 ± 1.7 days) compared to those with two ovaries (10.1 ± 1.4 days). Additionally, they needed significantly higher doses of follicle -stimulating hormone (FSH) (3906.8 ± 1860.6 mIU/ml compared to 2900.0 ± 1440.0 mIU/ml). The average number of retrieved oocytes was lower in the single ovary group (10.8 ± 4.5 versus 16.8 ± 10.9), and the number of metaphase II oocytes collected was also reduced (9.5 ± 4.5 versus 13.3 ± 7.7). Despite these differences in ovarian response, the pregnancy rates were similar between the groups, with the single ovary group achieving a pregnancy rate of 31.8% compared to 43.2% in the two-ovary group. n conclusion, although women with a single ovary required higher doses of FSH, endured longer stimulation periods, and produced fewer oocytes, their clinical pregnancy rates in assisted reproduction were strikingly comparable to those of women with two ovaries. This underscores the remarkable potential for successful outcomes in assisted reproductive technologies, regardless of ovarian count. This suggests that women with a single ovary can still achieve similar outcomes in assisted reproductive treatments.

The 2014 study by Zaraq Khan and colleagues aimed to evaluate in the group of women who undergo in vitro fertilization, the influence of unilateral oophorectomy on ovarian reserve (OVR) and on the ability to respond to gonadotropin stimulation (9). Specifically, study compares the ovarian responses of women after unilater oophorectomy to the ipsilateral ovary of women with both ovaries. A historical cohort study was conducted at an academic fertility clinic, including 51 women having only one ovary. The researchers matched these women in a 1:2 ratio with a control group of women who had both ovaries. Ovarian reserve was evaluated using day-3 follicle-stimulating hormone (FSH) levels, estradiol levels, and antral follicle counts. IVF outcomes were evaluated according to the number of aspirated follicles and retrieved oocytes. The baseline characteristics and ovarian reserve markers demonstrated not to differ significantly between the groups. Women with two ovaries exhibited a higher follicular yield and greater numbers of oocytes compared to those with UO. However, when comparing the ovary of UO patients to the ipsilateral ovary of the control group, the UO group showed a higher antral follicle count as well as increased follicular and oocyte yields. Multivariate analysis indicated that the remaining ovary in women with UO was more likely to produce a greater number of follicles and oocytes compared to the ipsilateral ovary in the control group. Importantly, live birth rates were comparable between the two groups. This suggests that the remaining ovary in women with UO exhibits a compensatory mechanism that enhances follicular yield after the surgery. These findings are consistent with prior animal studies and provide reassurance that women with UO can achieve favorable IVF outcomes. Consequently, patients with UO can be appropriately counseled regarding their reproductive potential.

Compelling review from 2017 by Younis and colleagues conducted a rigorous analysis of the literature, utilizing a range of electronic databases (10). This comprehensive study covered research published from January 1978 to December 2015 and focused on controlled studies comparing in IVF-ET outcomes between the group of women with a single ovary and the groupd of women with two functioning ovaries. The data extraction process involved two independent reviewers who meticulously assessed ovarian reserve markers, responses to controlled ovarian hyperstimulation (COH), and clinical pregnancy rates. Ultimately, the review included 21 studies encompassing 1,045 IVF cycles in women who undergone unilateral oophorectomy and 18,172 cycles in women with both ovaries. The meta-analysis yielded striking insights, revealing a significant difference in baseline follicle-stimulating hormone (FSH) levels with a weighted mean difference (WMD) of 2.01 IU/L (95% confidence interval [CI]: 0.24–3.79; P = 0.026). This finding highlights a notable reduction in ovarian reserve among women with one ovary. Additionally, the estradiol (E2) levels measured on the day of human chorionic gonadotropin (hCG) administration revealed to be dramatically lower in the test group with single ovary, showing a WMD of -431 pg/mL (95% CI: -616 to -246; P < 0.001). This suggests a significantly compromised ovarian response in these women. Remarkably, however, the analysis indicated that pregnancy rates were nearly similar between the groups (no significant difference), In addition an odds ratio (OR) were determined to be 0.76 (95% CI: 0.57–1.00; P = 0.054). The authors powerfully conclude that, despite the inherent variability among the studies, the findings compellingly suggest that while having a single ovary adversely affects ovarian reserve in terms of follicle quantity, it does not diminish oocyte quality or overall pregnancy outcomes following assisted reproduction. This insight emphasizes the resilience of reproductive potential, challenging assumptions about the limitations faced by women after unilateral oophorectomy.

The multicenter cohort study conducted by Tekla Lind and colleagues in Sweden and published in 2018 investigated whether women after unilateral oophorectomy experience a lower live birth rate (LBR) when treated with in vitro fertilization or intracytoplasmic sperm injection compared to those with two intact ovaries (11). Previous research in small cohorts or case-control studies demonstrated no significant difference in pregnancy rates between women with and without a history of UO undergoing IVF/ICSI; however, these studies mainly involved multiple embryo transfers. Notably, no large-scale investigation had previously assessed LBR in this patient population. To fill this gap, data were obtained from different reproductive medicine centers in Sweden, encompassing IVF/ICSI cycles conducted from January 1999 till November 2015. In majority of cases (70%) was single embryo was transferred (SET) and no significant difference in SET rates between the UO and control groups was demonstrated. The cases of fresh and frozen-thawed embryo transfers were included in study. In the group of prior unilateral oophorectomy 154 women were included and underwent IVF/ICSI cycles. The control group included 22,693 women undergoing in total 41,545 cycles. The outcomes were measured based on following criteria: live birth rate analyzed per cycle initiation, per ovum pickup (OPU), and per embryo transfer (ET) while as the secondary outcomes were analyzed the number of retrieved oocytes, supernumerary embryos, ovarian sensitivity index (OSI), embryo quality, and cumulative pregnancy rates. The results showed that LBR was significantly lower in the UO group (LBR per initiated cycle - 18.6%) compared to control group (25.4%), both in crude and age-adjusted analyses (P = 0.007 and P = 0.014, respectively. The LBR per OPU was 20.3% versus 27.1% (P = 0.012 and P = 0.015, respectively), and the LBR per ET was 23.0% compared to 29.7% (P = 0.022 and P = 0.025, respectively). This trend persisted when both fresh and frozen-thawed transfers were included in the analysis. Furthermore, the cumulative odds ratio (OR) for LBR per OPU was 0.70 (95% CI: 0.52–0.94, P = 0.016) and per ET was 0.68 (95% CI: 0.51–0.92, P = 0.012), indicating an approximately 30% reduction in live birth rates in the UO group. This study represents the largest cohort to date evaluating reproductive outcomes in women with prior UO, providing

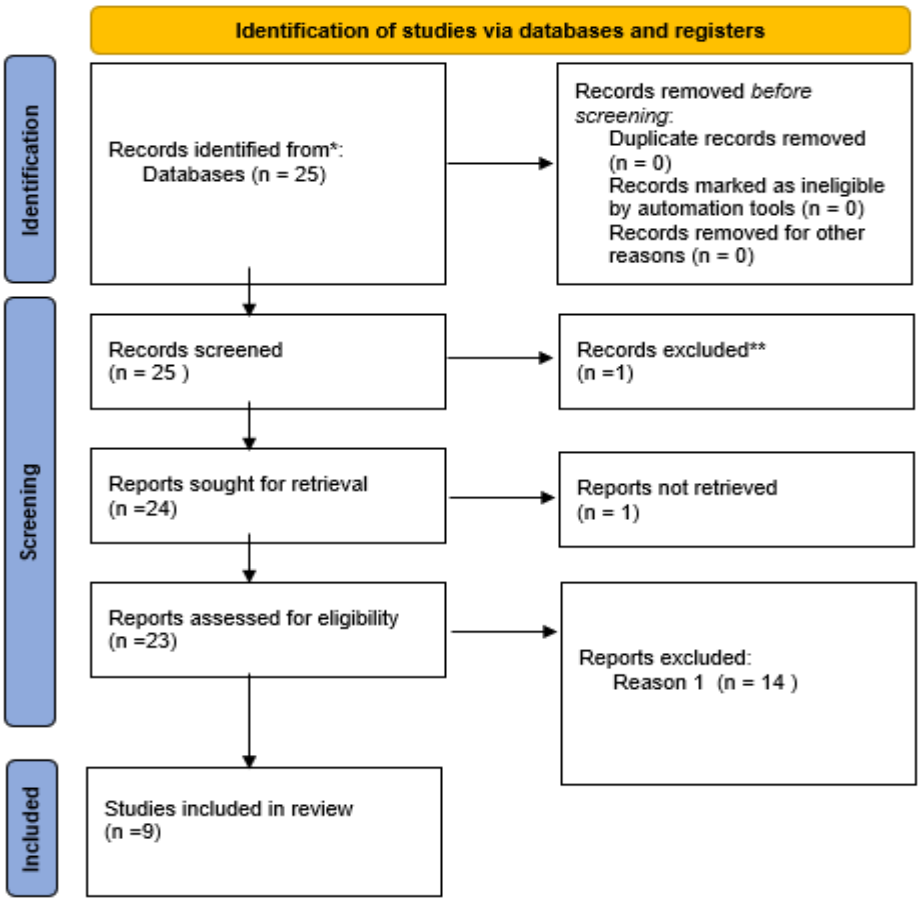
novel evidence that challenges earlier reports suggesting minimal or no impact of UO on IVF/ICSI success. These findings highlight the need for further prospective studies for better understanding of the long-term reproductive implications of UO. Despite its comprehensiveness, the study leaves several questions unanswered: What specific factors contributed to the observed lower live birth rates in individuals with a history of UO compared to women with intact ovaries? How does the high prevalence of endometriosis in the UO group affect the generalizability of the study's findings? What are the long-term reproductive implications for women with a history of UO beyond the outcomes measured in this study?

In 2022, a team of researchers affiliated with the New York University Grossman School of Medicine and the New York University Langone Fertility Center published a significant article investigating the results of assisted reproductive technology specifically in patients who have only one ovary (12). This study was motivated by the need to assess how having a single ovary impacts ART results compared to those who retain both ovaries. The research involved a retrospective cohort analysis, which gathered data from patients who had undergone at least one cycle of ART between 2012 and 2020 at an university-affiliated fertility center. The study included 104 patients with a single ovary, who underwent a total of 158 ART cycles, with a median age of 35.5 years. These patients were matched in a 3-to-1 ratio with 312 control patients possessing two ovaries, with a median age of 35.0 years. As the primary outcome was measured the metaphase II oocytes (MIIs) retrieved per cycle, while secondary outcomes expanded to include various markers, several laboratory findings, and ultimately, live birth rates. The analysis revealed that women with a single ovary exhibited notably lower levels of anti-Müllerian hormone (AMH), with a median of 1.1 ng/mL compared to 2.2 ng/mL in those with two ovaries ($p < 0.01$). This suggests a significantly reduced ovarian reserve. Conversely, day 2 follicle-stimulating hormone (FSH) levels were higher in the single-ovary group, with a median of 7.4 IU/L compared to 6.2 IU/L in the two-ovary group ($p < 0.01$), further indicating diminished ovarian function. When comparing ART outcomes, the median number of MIIs retrieved per cycle was significantly lower in the single-ovary group (7.5 MIIs) versus the two-ovary group (11.0 MIIs, $p < 0.01$), and the total number of oocytes retrieved followed a similar pattern, with averages of 10.0 and 14.5, respectively. Interestingly, despite these lower yields, patients with a single ovary achieved at least 50% of the oocyte production of their counterparts with two ovaries, suggesting an adaptive compensatory mechanism in the remaining ovary. Furthermore, despite the observable differences in ovarian responses, rates of fertilization, blastocyst formation, euploidy, and the likelihood of obtaining at least one viable embryo for transfer were statistically similar in both groups ($p > 0.40$). Live birth rates were also comparable, with the rate per embryo transfer being 45.8% for those with one ovary versus 46.6% for those with two ovaries ($p = 1.00$) and a live birth rate per patient undergoing transfer of 68.3% compared to 73.9% ($p = 0.55$). These findings highlight the important conclusion that while patients with a single ovary have fewer oocytes and MIIs available during ART cycles, their reproductive potential appears to remain robust. The ability of the remaining ovary to produce a significant number of oocytes indicates that ART can still be a feasible and successful option for women with one ovary, ultimately reinforcing the viability and effectiveness of assisted reproductive technologies in this patient population.

Conclusion

Research findings strongly indicate that women after unilateral oophorectomy can achieve outcomes in assisted reproductive technologies—such as in vitro fertilization and intracytoplasmic sperm injection - that are strikingly similar to those of women with two ovaries. While women with a single ovary may need higher doses of gonadotropins, endure longer stimulation periods, and retrieve fewer oocytes compared to their counterparts with two ovaries, their pregnancy rates per transfer are remarkably comparable. Even with a reduced ovarian response, the remaining ovary often compensates for the loss, ensuring an adequate ovarian reserve and preserving fertility potential. As a result, women with one ovary, including those who have had a UO, can confidently be reassured that their fertility and ART outcomes remain robust. Their likelihood of achieving a successful pregnancy is on par with that of women with both ovaries. However, it is crucial to evaluate individual factors such as age, ovarian reserve, and overall health when providing comprehensive counseling and tailored treatment options for these patients.

Figure 1. Article selection process adapted from PRISMA statement (3).



Selected articles included in this review are presented in Table 1 (Table 1).

Table 1. Artcles included in review

Authors	Title	Year	Type of study	Number of participants
C Boutteville et al	Results of in vitro fertilization attempts in patients with one or two ovaries	1987	prospective study	501
E Levitas et al	Treatment outcome in women with a single ovary versus patients with two ovaries undergoing in vitro fertilization and embryo transfer (IVF/ET)	2000	prospective study	57
R Levi et al	The outcomes of assisted reproductive technology cycles in patients with one or two ovaries	2003	prospective study	169
Safaa Al-Hasani et al	Comparison of the response to ovarian stimulation between women with one ovary and those with two ovaries, in a program of ICSI/ET	2003	prospective study	133
M S Hendricks et al	Treatment outcome of women with a single ovary undergoing in vitro fertilisation cycles	2010	prospective study	42
Zaraq Khan et al	Unilateral oophorectomy results in compensatory follicular recruitment in the remaining ovary at time of ovarian stimulation for in vitro fertilization	2014	Historical cohort study.	153
J S Younis Et al	The impact of unilateral oophorectomy on ovarian reserve in assisted reproduction: a systematic review and meta-analysis	2017	systematic review and meta-analysis	n/a
Tekla Lind et al	Reduced live-birth rates after IVF/ICSI in women with previous unilateral oophorectomy: results of a multicentre cohort study	2018	multicentre cohort study	154
Emily Auran et al	Two is not always greater than one: patients with one ovary have similar assisted reproductive technology (ART) outcomes compared to patients with two ovaries	2022	retrospective cohort study	104

References

1. Laughlin-Tommaso SK, Stewart EA, Grossardt BR, Rocca LG, Rocca WA. Incidence, time trends, laterality, indications, and pathological findings of unilateral oophorectomy before menopause. *Menopause*. 2014;21(5):442-449. doi:10.1097/GME.0b013e3182a3ff45
2. Gasparri ML, Ruscito I, Braicu EI, et al. Biological Impact of Unilateral Oophorectomy: Does the Number of Ovaries Really Matter?. *Geburtshilfe Frauenheilkd*. 2021;81(3):331-338. doi:10.1055/a-1239-3958
3. Page M J, McKenzie J E, Bossuyt P M, Boutron I, Hoffmann T C, Mulrow C D et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews BMJ 2021; 372 :n71 doi:10.1136/bmj.n71
4. Boutteville C, Muasher SJ, Acosta AA, Jones HW Jr, Rosenwaks Z. Results of in vitro fertilization attempts in patients with one or two ovaries. *Fertil Steril*. 1987;47(5):821-827. doi:10.1016/s0015-0282(16)59172-9
5. Levitas E, Furman B, Shoham-Vardi I, Lunenfeld E, Potashnik G. Treatment outcome in women with a single ovary versus patients with two ovaries undergoing in vitro fertilization and embryo transfer (IVF/ET). *Eur J Obstet Gynecol Reprod Biol*. 2000;88(2):197-200. doi:10.1016/s0301-2115(99)00155-4
6. Levi R, Özçakir HT, Alatas E, Göker EN, Tavmergen E. The outcomes of assisted reproductive technology cycles in patients with one or two ovaries. Journal of obstetrics and gynaecology research. 2003 Oct;29(5):321-5.
7. Al-Hasani S, Asimakopoulos B, Nikolettos N, Diedrich K. Comparison of the response to ovarian stimulation between women with one ovary and those with two ovaries, in a program of ICSI/ET. *Acta Obstet Gynecol Scand*. 2003;82 (9):845-849. doi:10.1034/j.1600-0412.2003.00201.x
8. Hendricks MS, Chin H, Loh SF. Treatment outcome of women with a single ovary undergoing in vitro fertilisation cycles. *Singapore Med J*. 2010;51(9):698-701.
9. Khan Z, Gada RP, Tabbaa ZM, et al. Unilateral oophorectomy results in compensatory follicular recruitment in the remaining ovary at time of ovarian stimulation for in vitro fertilization. *Fertil Steril*. 2014;101(3):722-727. doi:10.1016/j.fertnstert.2013.11.019
10. Younis JS, Naoum I, Salem N, Perlitz Y, Izhaki I. The impact of unilateral oophorectomy on ovarian reserve in assisted reproduction: a systematic review and meta-analysis. *BJOG*. 2018;125(1):26-35. doi:10.1111/1471-0528.14913
11. Lind T, Holte J, Olofsson JI, et al. Reduced live-birth rates after IVF/ICSI in women with previous unilateral oophorectomy: results of a multicentre cohort study. *Hum Reprod*. 2018;33(2):238-247. doi:10.1093/humrep/dex358
12. Auran E, Cascante S, Blakemore J. Two is not always greater than one: patients with one ovary have similar assisted reproductive technology (ART) outcomes compared to patients with two ovaries. *J Assist Reprod Genet*. 2022;39(8):1789-1796. doi:10.1007/s10815-022-02534-9