Short Communication
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Impact of maternal age on fertilization and blastulation in low oocyte yield IVF cycles

Abstract

This retrospective analysis evaluates IVF outcomes in cycles with ≤3 retrieved oocytes, focusing on fertilization and blastocyst formation rates stratified by age. Despite the limited number of oocytes, fertilization and blastulation outcomes were promising in selected patients, supporting continued treatment attempts in poor ovarian responders, particularly women under 41 years of age. These findings suggest that oocyte quality may remain preserved despite a low yield, and that individualized counseling can help guide clinical decision-making.

Keywords: IVF, low oocyte yield, fertilization rate, blastocyst formation, age effect, poor ovarian response, ART

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Abbreviations: IVF, *In Vitro* fertilization; POR, poor ovarian response; ET, embryo transfer; FET, frozen embryo transfer; MII, metaphase II oocyte; ART, assisted reproductive technology; ICSI, intracytoplasmic sperm injection

Introduction

Low oocyte yield remains a significant challenge in assisted reproductive technology (ART), particularly in women undergoing in vitro fertilization (IVF). The number of retrieved oocytes directly influences fertilization potential, embryo development, and the likelihood of achieving a viable pregnancy. Women presenting with a low oocyte yield often have diminished ovarian reserve, advanced maternal age, or underlying reproductive pathology, all of which can adversely affect treatment outcomes.

Age is recognized as one of the strongest predictors of reproductive success. Increasing female age is associated with reduced oocyte competence, higher rates of aneuploidy, and impaired embryo development. As a result, even when oocytes are successfully retrieved, their ability to fertilize and progress to the blastocyst stage may be compromised in older women. Understanding how age interacts with low oocyte yield is crucial for patient counseling, tailoring stimulation protocols, and optimizing expectations during IVF cycles.

The objective of this study is to evaluate the embryological outcomes of IVF cycles with low oocyte yield, specifically examining the influence of maternal age on fertilization success and blastocyst formation. By analyzing outcomes across different age groups, this retrospective study aims to provide meaningful insights into the prognostic value of age in low-yield cycles and to assist clinicians in more accurately guiding patients regarding their reproductive prognosis.

Material and methods

This retrospective review analyzed IVF cycles performed at Al Shaheen Medical Center, Qatar. All cycles included in the study involved patients with ≤3 retrieved oocytes and were categorized as having a low oocyte yield. Data were collected from both electronic and manual IVF laboratory records.

Study population

Patients were categorized into the following maternal age groups:

≤30 years

30–35 years

36–40 years

≥40 years

Cycles were included if oocyte retrieval yielded three or fewer oocytes. Cycles were excluded if no mature (MII) oocytes were obtained or if clinical data were incomplete.

Ovarian stimulation and trigger protocols

Controlled ovarian stimulation was performed using either a GnRH antagonist or agonist protocol, based on clinical discretion and patient characteristics. Gonadotropin doses were individualized according to age, ovarian reserve parameters, and previous ovarian response, with daily doses ranging from 300 to 450 IU.

Final oocyte maturation was triggered using human chorionic gonadotropin (hCG) or a dual-trigger approach with both hCG and a GnRH agonist, depending on ovarian response and risk assessment.

Laboratory procedures

Standard IVF and intracytoplasmic sperm injection (ICSI) techniques were used according to clinical indication. All retrieved mature (metaphase II) oocytes were subjected to ICSI. Sperm immobilization was performed using polyvinylpyrrolidone (PVP). Oocytes were handled in HEPES-buffered medium supplemented with protein, using 10 µL micro-drops overlaid with culture oil.

Following ICSI, injected oocytes were cultured in Vitrolife G-TL culture medium under controlled conditions (6% CO_2 and 5% O_2) in a dry incubator.

Fertilization assessment

Fertilization was assessed 16–18 hours post-ICSI. Normal fertilization was defined by the presence of two pronuclei (2PN) and two polar bodies.

Embryo culture and grading

Embryo development was evaluated daily until day 5 of culture. Embryos reaching the blastocyst stage were assessed and graded according to the Gardner and Schoolcraft blastocyst grading system, based on the degree of expansion, inner cell mass, and trophectoderm quality. No modifications to standard laboratory protocols were introduced during the study period.

Outcome measures

Fertilization rate: Defined as the number of normally fertilized oocytes (2PN) divided by the total number of injected metaphase II (MII) oocytes.

Blastulation rate

Defined as the number of blastocysts formed divided by the number of fertilized MII oocytes cultured to day 5.

Clinical outcomes, including implantation, clinical pregnancy, and live birth, were not analyzed due to variability in subsequent treatment decisions.

Statistical analysis

Descriptive statistics were used to summarize fertilization and blastulation outcomes across age groups. Exact binomial (Clopper–Pearson) 95% confidence intervals were calculated only when denominators were sufficient. Confidence intervals were not computed for groups with fewer than five observations, zero events, or single observations because of statistical instability. All analyses were descriptive and exploratory in nature, and no formal statistical comparisons between age groups were performed.

Results

A total of 63 IVF cycles with low oocyte yield were analyzed. The majority of cycles (46.0%) resulted in the retrieval of a single oocyte. Cycles yielding zero, two, and three oocytes accounted for 17.5%, 20.6%, and 15.9% of cases, respectively. The distribution of retrieved oocytes per IVF cycle is illustrated in Figure 1.

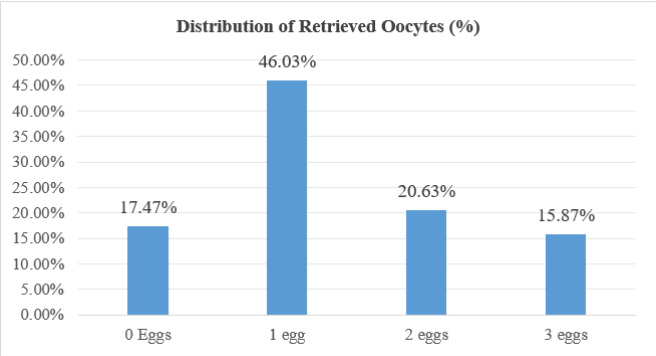

Figure 1 Distribution of retrieved oocytes per IVF cycle in low oocyte yield cases.

Across all cycles, 85 cumulus–oocyte complexes (COCs) were retrieved. Of these, 69 oocytes were at the metaphase II (MII) stage at the time of intracytoplasmic sperm injection (ICSI). The proportion of mature oocytes was calculated using the total number of COCs retrieved as the denominator. Age-stratified MII yields were 100% (1/1) in women aged ≤30 years, 90.5% (19/21) in the 30–35 years group, 80% (16/20) in the 36–40 years group, and 76.7% (33/43) in women aged ≥40 years.

All MII oocytes were subjected to ICSI. Fertilization outcomes were calculated using the number of injected MII oocytes as the denominator. Normal fertilization (2 pronuclei, 2PN) was observed in 100% (1/1) of oocytes in women aged ≤30 years, 89.5% (17/19) in the 30–35 years group, 75% (12/16) in the 36–40 years group, and 72.7% (24/33) in women aged ≥40 years (Table 1).

Table 1 Fertilization and blastulation outcomes according to maternal age group in low oocyte yield IVF cycles

Age Group	n (cycles)	Fertilization Rate (n/N)	95% CI	Blastulation Rate (n/N)	95% CI
≤30 yrs	1	100% (1/1)	Not estimable	—	—
30–35 yrs	22	89.5% (17/19)	66.9–98.7%	66.7% (2/3)	Not estimable
36–40 yrs	8	75% (12/16)	Not estimable	—	—
≥40 yrs	32	72.7% (24/33)	39.0–94.0%	22.2% (2/9)	2.8–60.0%

Footnotes: Data are presented as n/N (%). Exact binomial (Clopper-Pearson) 95% confidence intervals were calculated only when denominators were sufficient (n ≥ 5). Dashes indicate outcomes that could not be computed due to absence of fertilized oocytes or blastocyst formation.

Extended embryo culture to day 5 was performed in a subset of nine cycles, based on clinical indication and embryo availability. These included one cycle in women aged 30–35 years, three cycles in the 36–40 years group, and five cycles in women aged ≥40 years. No cycles in women aged <30 years underwent extended culture.

Blastocyst development rates were calculated using the number of normally fertilized (2PN) embryos cultured to day 5 as the denominator. Blastulation was observed in 2 of 3 embryos (66.7%) in women aged 30–35 years and in 2 of 9 embryos (22.2%) in women aged ≥40 years.

Discussion

This retrospective descriptive analysis evaluated embryological outcomes in IVF cycles characterized by low oocyte yield. Despite the limited number of retrieved oocytes, fertilization and blastocyst formation were observed across multiple maternal age groups, indicating that embryonic developmental competence may be retained in selected low-yield cycles.

The findings support the concept that embryological outcomes are not determined solely by oocyte quantity. When mature oocytes are successfully retrieved and fertilization is achieved, intrinsic oocyte competence appears to play a critical role in subsequent embryo development. This observation is particularly relevant for poor ovarian responders, whose treatment prognosis is often based primarily on oocyte number.

Within the analyzed cohort, fertilization and blastocyst formation were observed in women aged 30–35 years, consistent with previous reports describing relatively preserved oocyte competence in this age

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range despite diminished ovarian response. Importantly, blastocyst development was also documented in selected patients aged ≥40 years, suggesting that advanced maternal age does not uniformly preclude embryonic developmental potential when mature oocytes are obtained and normal fertilization occurs.

Analysis of oocyte yield distribution demonstrated that nearly half of all cycles yielded a single oocyte. Nevertheless, successful fertilization and progression to the blastocyst stage were observed in a subset of these cycles. This finding underscores the clinical relevance of proceeding with IVF treatment in low-yield scenarios, as even a single mature oocyte may retain the capacity to generate a developmentally competent embryo.

Although maternal age remains an important factor influencing reproductive outcomes, these observations emphasize that oocyte count alone should not be used as the sole determinant of embryological potential. Individualized assessment of oocyte competence and early embryo development may provide a more accurate framework for patient counseling and clinical decision-making in low oocyte yield IVF cycles.[1–5]

Limitations

The primary limitation of this study is the absence of clinical pregnancy and live birth outcomes. Therefore, the findings should be interpreted as reflective of embryological potential rather than definitive clinical success. Additionally, the descriptive nature of the analysis and the small sample sizes within certain age groups limit generalizability.

Conclusion

In IVF cycles characterized by low oocyte yield, fertilization and blastocyst formation can still be observed across a range of maternal ages. These findings suggest that a reduced oocyte number does not uniformly preclude embryological development. Descriptive evaluation of embryological outcomes may support individualized counseling and informed decision-making in patients with poor ovarian response.

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Conflicts of interest

The authors declare no conflicts of interest.

References

1. Oudendijk JF, Yarde F, Eijkemans MJC, et al. The poor responder in IVF: Is the prognosis always poor? A systematic review. *Hum Reprod Update*. 2012;18(1):1–11.
2. Ferraretti AP, Marca A La, Fauser BCJM, et al. ESHRE consensus on the definition of 'poor response' to ovarian stimulation for in vitro fertilization: the Bologna criteria. *Hum Reprod*. 2011;26(7):1616–1624.
3. Berkkanoglu M, Coetzee K, Bulut H, et al. Optimal embryo transfer strategy in poor response may include freeze-all. *J Assist Reprod Genet*. 2017;34(1):79–87.
4. Sainte-Rose R, Petit C, Dijols L, et al. Extended embryo culture is effective for patients of an advanced maternal age. *Sci Rep*. 2021;11:13499.
5. Zhu HB, Zhang ZH, Fadlalla E, et al. Culturing surplus poor-quality embryos to blastocyst stage has positive predictive value of clinical pregnancy rate. *Iran J Reprod Med*. 2014;12(9):609–616.