International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Grover AM et al. Int J Reprod Contracept Obstet Gynecol. 2026 Oct;15(10):4018-4025
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20263440

Original Research Article

Oocyte count at retrieval as predictor of pregnancy rate in different age groups in the Indian population

Aneesha M. Grover*, Vandana Bhatia, Sonia Malik

Nova Fertility and IVF, Vasant Vihar, Delhi, India

Received: 13 August 2026
Revised: 20 September 2026
Accepted: 21 September 2026

***Correspondence:**
Dr. Aneesha M. Grover,
E-mail: aneesha.grover@novaivffertility.com

ABSTRACT

Background: An important consideration while planning *in vitro* fertilization (IVF) is whether an age-specific oocyte number can predict treatment success. Identifying such thresholds may aid counselling regarding embryo pooling and the need for donor oocytes.
Methods: This retrospective, multicentric, cross-sectional study was conducted at Nova Fertility and IVF Clinics across India. Women aged 21-50 years undergoing IVF between August 2019 and July 2024 who met the inclusion and exclusion criteria were included. A total of 1994 patients were enrolled: 149 aged 21-25 years, 580 aged 26-30 years, 813 aged 31-35 years, 381 aged 36-40 years, and 71 aged >40 years. Clinical pregnancy rates were evaluated across age groups and varying mature oocyte (MII) yields using appropriate statistical methods.
Results: Total oocyte retrieved declined with advancing age, whereas the median number of mature oocytes remained relatively stable. The minimum MII oocyte number associated with successful outcomes decreased with increasing age: 9.5 at 21-25 years age, 7.5 at 31-35 years, and 4.5 at 36-40 years, increasing to 5.5 in women >40 years. There was a non -linear relation between age, oocyte yield and clinical pregnancy outcomes, with most favourable outcomes in women aged 26-35 years and low success rates at the extremes of reproductive age (<25 years and >36 years).
Conclusions: Although the mature oocyte number associated with successful IVF outcomes varies with age, oocyte number alone does not determine success. Thus, individualized counselling remains essential.

Keywords: Oocyte number, Clinical pregnancy rate, Age, IVF success rate

INTRODUCTION

Over the years, IVF has evolved and its success rate has steadily increased. However, during the treatment process, IVF specialists frequently encounter situations which give rise to dilemmas in their mind regarding the appropriateness of continuing the treatment.

One situation is when there is a poor response during controlled ovarian stimulation and the oocytes retrieved are fewer than expected. The question which arises here is whether these few oocytes are sufficient to continue the cycle up to embryo transfer or should the patient be counselled for repeat cycle for the oocyte/ embryo pooling.

The other category of patients includes those who have a poor reserve at the onset itself due to advanced age or some pathology. In this subgroup, the number of oocytes retrieved may be low but are appropriate according to the reserve. The question in this subcategory is how many oocytes are required to get a successful outcome.

In both these situations, the pertinent question is whether a specific oocyte count can be taken as a predictor for successful outcome in different age groups.

Additionally, it has also been shown that age and ethnicity also play a very important influencing role in the success of an IVF cycle. Shingshetty et al showed that advanced

age of >35 years had a direct negative effect on the ovarian reserve which resulted in reduced oocyte quantity and quality.[1]

Also, Kan et al found that the Asian women had a significantly lower clinical pregnancy and live birth rate than their Caucasian counterparts.[2] Patel et al further found that the ongoing pregnancy rates among the Indian population was significantly lower compared to the white Caucasian population.[3]

Wang et al conducted a large study on the Chinese population to seek an association between the number of oocytes retrieved and the cumulative live birth rate in different female age strata and concluded that both age and number of oocytes retrieved are factors which independently affect the live birth rate and also found that in women ≤35 years, ideally >6 oocytes are needed to be retrieved while in women ≥ 38 years, >14 oocytes are needed to be retrieved for a successful outcome.[4]

While parameters like age as a predictor of IVF success is well established, using oocyte number in a particular age group as a predictor of IVF success is still under study. Also, most of the reference values for parameters defining IVF success, such as oocyte number, fertilization rate, blastulation rate, etc are derived from studies conducted on the Caucasian population with one large study by Wang et al which was published from China. Since it is well known that ethinicity affects IVF success rates, this study attempts to define the age-wise oocyte number in the South-East Asian population. This correlation will help the clinicians in counselling and formulating a future treatment plan for patients where low oocyte count is encountered during ovarian stimulation.

METHODS

Study type

This is a retrospective, multi-centric and cross-sectional study.

Study place

The study was conducted at Nova Fertility and IVF, Vasant Vihar, Delhi, India while data was obtained from all Nova centers across India.

Study duration

The data for the study was extracted over five years between August 2019 to July 2024.

Inclusion criteria

All women in the age group of 21 to 50 years who had undergone IVF at any of the branches of the IVF Clinic chain were considered for inclusion in the study.

Exclusion criteria

Women who had undergone donor gamete cycle, cycles in which no oocyte was retrieved or where no embryo was transferred were excluded from the study.

Procedure

The minimum estimated sample size was calculated to be 1855 at a 5% significance level for a period of 5 years.

The data of 1994 women who had undergone IVF-ICSI between August 2019 and July 2024 and who satisfied the inclusion and exclusion criteria was extracted from the centralized database of the organization.

The data extracted included patient demographics, stimulation protocol used, total number of oocytes retrieved, total mature oocytes retrieved, fertilization rate and pregnancy rate. The extracted data was then stratified into different age groups namely 21-25 years, 26-30 years, 31-35 years, 36-40 years and >40 years. The oocyte number in each of these age groups was then correlated with pregnancy rate using appropriate statistical methods.

Ethical approval

The study was commenced after obtaining institutional ethics committee approval (F.1/IEC/IFS/2025/No.10, Dated: 06/02/2025) and spanned from August 2019 to July 2024.

Statistical analysis

The main objectives of the statistical analysis are: Determine the ratio of total oocytes to mature (MII) oocytes in different age groups stratified into 21-25, 26-30, 31-35, 36-40, and >40 years. Identify the minimum number of mature (MII) oocytes required in each age group to achieve a successful pregnancy

To achieve these objectives, the appropriate statistical tests and methods were applied: Descriptive statistics (mean, median, and range) for each age group. ANOVA or Kruskal-Wallis Test to compare the ratio of total to mature oocytes across different age groups. Logistic Regression Analysis to determine the relationship between the number of MII oocytes and pregnancy rates. Receiver operating characteristic (ROC) curve analysis to identify the cut-off point or minimum number of mature oocytes that significantly improves the likelihood of pregnancy. Chi-square test or Fisher's exact test for categorical comparisons of pregnancy rates across different oocyte number categories.

Outcome measures

The primary outcomes measures were: Clinical pregnancy rate (presence of gestational sac with cardiac activity on transvaginal ultrasound).

The secondary outcome measures were: Fertilization rate (2PN/oocytes), blastulation rate (blastocysts/ cleaved embryos) and implantation rate (G sacs/ embryos transferred).

RESULTS

The data of 1994 women who had undergone IVF-ICSI between August 2019 and July 2024 was analysed. Patients were sub-grouped in 5 subgroups based upon age.

Table 1 describes the age-wise distribution of the patients

Table 1: Age-wise Distribution of patients.

Age category (in years)	N (%)
21-25	149 (7.5%)
26-30	580 (29.1%)
31-35	813 (40.8%)
36-40	381 (19.1%)
>40	71 (3.5%)

Most patients (40.8%) belonged to the age group of 31-35 years followed by 26-30 years at 29.1%. 7.5% of the patients belonged to 21-25 years group, 19.1% to 36-40 years group and 3.5% patients to the >40 years group.

Table 2 compares the baseline clinical data among the different age groups.

The total number of mature oocytes (MII) and oocytes retrieved peaked in the 31-35 age group and declined in older patients. However, the proportion of mature oocytes (M2 ratio) did not follow the same trend, with mean ratios ranging from 0.735 in the 31-35 group to 0.813 in women >40 years. Maturation rates varied from 71.2% to 76.3%, highest in the >40 age group, suggesting a subset of older patients had unusually high oocyte maturation. This may be due to the difference in total number of patients in the different age groups. However, the average number of oocytes retrieved per patient was maximum in age group of 21-30 years, with a decreasing trend as age increases.

The following Table 4 gives an overview of the IVF cycle outcomes based on maternal age.

The following Table 4 compares the oocyte maturation rates and IVF outcomes in the different age groups.

Table 2: Comparison of basic clinical data.

Age (in years)		21-25 N (%)	26-30 N (%)	31-35 N (%)	36-40 N (%)	>40 N (%)	P value
BMI (kg/m^2)		24.4 (4.70)	25.4 (4.70)	26.3 (5.26)	27.6 (5.24)	26.9 (5.02)	<0.05 (Kruskal Wallis test)
Years of infertility (years)		3	3	4	5	5	0.0347 (Kruskal Wallis test)
Factor for infertility	Male	(4/149) 2.68%	(4/580) 0.69%	(15/813) 1.84%	(0/381) 0.00%	(1/71) 1.41%	
	Female	(16/149) 10.74%	(129/580) 22.24%	(245/813) 30.13%	(117/381) 30.71%	(27/71) 38.03%	
	Both	(2/149) 1.34%	(2/580) 0.3%	(11/813) 1.35%	(0/381) 0.00%	(1/71) 1.41%	
Type of infertility	Primary	(1/149) 0.67%	(15/580) 2.59%	(25/813) 3.07%	(5/381) 1.31%	(0/71) 0.00%	
	Secondary	(0/149) 0.00%	(4/580) 0.69%	(13/813) 1.59%	(6/381) 1.57%	(1/71) 1.41%	
Duration of stimulation (days)		9.04 (2.64)	9.04 (2.98)	9.26 (3.35)	9.67 (4.07)	9.96 (4.09)	<0.05 (Kruskal Wallis test)
Average oocytes retrieved/ patient		9.72 (4.45)	9.27 (5.29)	8.52 (4.96)	6.22 (4.18)	5.11 (3.76)	<0.05 (Kruskal Wallis test)
Average M-II oocytes retrieved/patient		7.18 (3.46)	6.64 (3.83)	6.06 (3.61)	4.60 (3.16)	3.96 (2.92)	<0.05 (Kruskal Wallis test)
Fertilization rate		81.0%	81.1%	82.0%	83.2%	82.7%	<0.05 (Chi-square Test)
Blastulation rate		45.4%	45.4%	47%	41.9%	34.1%	<0.05 (chi-Square Test)
Av no. of blasts transferred		2.64 (2.73)	2.44 (2.52)	2.34 (2.35)	1.60 (1.89)	1.10 (1.60)	<0.05 (Kruskal Wallis test)
Implantation rate (%)		20.6%	29.2%	28.5%	16.2%	9.6%	<0.05 (chi-square test)
CPR (%)		30.9%	38.8%	38.0%	22.0%	14.1%	<0.05 (chi-Square Test)
Miscarriage rate (%)		3.64% (2/55)	5.22% (14/268)	7.71% (28/363)	9.26% (10/108)	21.4% (3/14)	0.1094 (Fisher exact test)

Table 3: IVF outcomes and maturation rates by age group.

Age group (in years)	N	Total oocytes	Total MII	Mean M2 ratio	Maturation rate (%)	SD	Significant pairwise differences (Dunn Test, P. adj)
21-25	149	1,448	1,070	0.755	73.9	0.172	-
26-30	580	5,376	3,851	0.739	71.6	0.199	26-30 vs 36-40 (0.029)
31-35	813	6,928	4,930	0.735	71.2	0.196	31-35 vs 36-40 (0.028)
36-40	381	2,368	1,751	0.766	73.9	0.211	-
>40	71	363	277	0.813	76.3	0.195	>40 vs 21-25 (0.044), >40 vs 26-30 (0.007), >40 vs 31-35 (0.013)

Table 4: IVF outcomes by age group.

Age group (in years)	Fertilization rate	Blastulation rate	Implantation rate	Clinical pregnancy rate
21-25	867/ 1070 (81.0%)	394/ 867 (45.4%)	49/ 238 (20.6%)	46/ 149 (30.9%)
26-30	3123/ 3851 (81.1%)	1417/ 3123 (45.4%)	280/ 960 (29.2%)	225/ 580 (38.8%)
31-35	4042/ 4930 (82.0%)	1900/ 4042 (47.0%)	376/ 1320 (28.5%)	309/ 813 (38.0%)
36-40	1457/ 1751 (83.2%)	610/ 1457 (41.9%)	96/ 594 (16.2%)	84/ 381 (22.0%)
>40	229/ 277 (82.7%)	78/ 229 (34.1%)	11/ 115 (9.6%)	10/ 71 (14.1%)

The fertilization rate remained relatively constant across all age groups, ranging from 81.0% (867/1070) in women aged 21-25 years to 83.2% (1457/1751) in those aged 36-40 years. This indicates that the fertilization process was not significantly affected by increasing maternal age.

The blastulation rate showed an age-related decline, being highest at 47.0% (1900/4042) in the 31-35 years group and dropping to 34.1% (78/229) in women older than 40 years.

The implantation rate followed a declining trend, from 29.2% (280/960) in the 26-30 years group to 9.6% (11/115) in women above 40 years.

The clinical pregnancy rate (CPR) was highest among women aged 26-30 years (38.8%, 225/580), followed closely by those aged 31-35 years (38.0%, 309/813). A sharp decline was observed in older age groups, with CPR decreasing to 22.0% (84/381) in women aged 36-40 years and 14.1% (10/71) in those above 40 years.

The number of oocytes and mature MII oocytes retrieved steadily declines with age, with maximal decline beyond the age of 35 years. A similar trend was observed in the blastulation rate and clinical pregnancy rate with maximum positive results in younger patients (<35 years) and significant decline beyond the age of 35 years.

An association between the number of mature (MII) oocytes and clinical pregnancy rates (CPR) in each maternal age group was sought using different statistical tests and is described in Table 6. Through all the age groups, there was an association between the number of mature M-II oocytes retrieved and the clinical pregnancy rate.

A logistic curve analysis and ROC Curve Analysis was done to assess the number of mature oocytes required to achieve a clinical pregnancy across all age groups. The following table (Table 7) gives the age-wise minimum number of oocytes required for a successful outcome.

Table 5: IVF outcome by age and oocyte number.

Age group (in years)	Mean OR (SD)	Mean MII (SD)	MII/OR (%)	Blast rate (%)	CPR (%)
21-25	9.72 (4.45)	7.18 (3.46)	73.86	45.4	30.9
26-30	9.27 (5.29)	6.64 (3.83)	71.63	45.4	38.8
31-35	8.52 (4.96)	6.06 (3.61)	71.13	47.1	38.0
36-40	6.22 (4.18)	4.60 (3.16)	73.95	41.9	22.0
>40	5.11 (3.76)	3.90 (2.92)	76.32	34.1	14.1

Table 6: Association between number of mature oocytes and CPR in each age group.

Age group (in years)	Test used	P value	Interpretation
21-25	Chi-square test	0.0681	Not statistically significant, but a suggestive trend of higher CPR with more MII oocytes
26-30	Chi-square test	0.0014	Statistically significant association; pregnancy rates increased with higher MII oocyte numbers

Continued.

Age group (in years)	Test used	P value	Interpretation
31-35	Chi-square test	0.0013	Statistically significant association between MII count and CPR
36-40	Fisher's exact test	0.0038	Significant relationship between MII categories and CPR
>40	Fisher's exact test	0.0398	Marginally significant association indicating reduced but still relevant influence of MII count on CPR

Table 7: Optimal number of MII oocytes for clinical pregnancy by age group.

Age group (in years)	Optimal MII (Cutoff)	Sensitivity	Specificity	AUC
21-25	9.5	0.35	0.83	0.61
26-30	6.5	0.55	0.60	0.59
31-35	7.5	0.39	0.74	0.59
36-40	4.5	0.56	0.62	0.62
>40	5.5	0.50	0.84	0.68

It is seen that younger women (21-35 years) required higher numbers of mature oocytes to optimize clinical pregnancy probability, whereas women over 35 years achieved comparable outcomes with fewer MII oocytes. Sensitivity ranged from 0.35-0.56, specificity from 0.60-0.84, and AUC values were modest (0.59-0.68), indicating that MII oocyte count alone is a moderate predictor of clinical pregnancy.

The area under the ROC curve (AUC) was highest in the youngest group (21-25 years, 0.868) and decreased with age (26-30: 0.751; 31-35: 0.671; 36-40: 0.655; >40: 0.68), suggesting that MII count is a stronger predictor of pregnancy in younger women but less reliable in older women due to additional age-related factors.

DISCUSSION

In recent times IVF is considered as a key component of ART treatment. With the advancement in our knowledge and development of newer technologies, the scope of IVF treatment has widened to encompass a multitude of etiologies of infertility and it has also seen an increase in success rate. However, as more and more clinicians are opting for this treatment modality, they frequently encounter situations which give rise to dilemmas in their mind regarding the appropriateness of continuing the treatment.

One situation is when there is a poor response during controlled ovarian stimulation irrespective of the age of the patient, where these patients are categorized as poor responders. The question which arises here is whether these few oocytes are sufficient to continue the cycle up to embryo transfer or should the patient be counselled for repeat cycle for oocyte/ embryo pooling.

The other category of patients is who have a poor reserve at the onset itself due to advanced age or some pathology. In this subgroup, the number of oocytes retrieved may be low but are appropriate according to the reserve. The question in this subcategory is how many oocytes are required to get a successful outcome.

In both these situations, the pertinent question is whether a specific oocyte count can be taken as a predictor for successful outcome in different age groups.

Apart from age, ethnicity also contributes to IVF success rates with Caucasians having better pregnancy rates than Asians. Kan et al conducted a retrospective analysis on 2594 patients to determine if there is a difference in pregnancy rate between Asian and Caucasian women when they undergo IVF and found that the Asian women had a significantly lower clinical pregnancy and live birth rate than their Caucasian counterparts.[2] It was also seen that higher doses of gonadotrophin were used during stimulation in Asian population but fewer oocytes were retrieved and resultant fewer embryos were formed for transfer or cryopreservation. Patel et al assessed the difference in IVF outcomes based on ethnicity and evaluated 5,549 cycles in Spain and India. They found that the ongoing pregnancy rates among the Indian population was significantly lower compared to the white Caucasian population and concluded that ethnicity is an independent predictor of IVF outcomes.[3]

It is thus important to understand if there is a difference in the reference values for various parameters defining IVF success such as oocyte number, fertilization rate, blastulation rate, etc between the Asian and Caucasian population. There are not many studies conducted on the southeast Asian population to define the reference parameters for IVF outcomes. This study has tried to define the oocyte numbers in the various age groups in the Indian population to achieve a positive IVF outcome. These values can thus be used to develop reference cutoffs for the Asian population.

Age and IVF outcome

Many studies have been conducted to evaluate the role of key clinical and laboratory parameters which influence the

success of an ART cycle. Shingshetty et al conducted a review of literature to identify the key predictors of IVF treatment success and found that female age had the highest impact on the chance of clinical pregnancy or live birth with direct negative impact on ovarian reserve at >35 years age.[1]

Tur-Kaspa et al retrospectively evaluated data of 1547 women to assess the relationship between age and oocyte quality, measured by maturity rate, and blastocyst and euploidy rates. They did not find any statistically significant difference in oocyte maturity rate among the different age groups. Blastocyst rates were significantly different among age groups with steady decline with increasing age.[5]

Similar to Tur-Kaspa's study, in our study also the median number of mature oocytes remained relatively stable across age groups but the proportion of mature oocytes (M2 ratio) tended to increase with age, particularly in women over 40 years. This indicates that while the total number of oocytes retrieved declines with advancing age, the quality of oocytes in terms of maturation may be preserved or even higher in certain older patients. Additionally, while fertilization efficiency remains largely unaffected by maternal age, subsequent stages of embryo development and implantation are significantly compromised as age increases. The decline in blastulation, implantation, and clinical pregnancy rates beyond 35 years reflects the negative influence of oocyte aging, including reduced developmental competence and higher rates of chromosomal abnormalities in embryos.

Overall, this analysis emphasizes that maternal age is a critical determinant of IVF success, and that the optimal reproductive window for achieving favourable outcomes lies between 26 and 35 years of age.

Oocyte number and IVF success rate

On reviewing the role of oocyte number on the IVF treatment success rate, Sunkara et al found a positive correlation between oocyte number and live birth rate. They observed an increase in the success rate up to 15 eggs, followed by a plateau between 15-20 eggs and a subsequent gradual decline thereafter.[6]

Similarly, Polyzos et al had observed that the probability of live birth increased up to 7 oocytes, remained relatively unchanged up to 20 oocytes followed by a significant decline beyond that.[7]

Bahadur et al conducted a retrospective longitudinal observational study involving 1,72,341 IVF cycles to elucidate a correlation between number of oocytes retrieved and IVF outcomes. The patients were divided into 6 subgroups according to the number of oocytes retrieved and found that the ART success rate was high when 6-25 oocytes were retrieved (35.3% with 16-26 oocytes and 32.4% with 6-15 oocytes). However, success declined with too few (17.22% with $\leq$ 5 oocytes) and too many (18.71% with $\geq$26 oocytes) oocytes retrieved.[8]

Another study by Fanton et al sought an association between the oocyte numbers and IVF outcome. They found that the live birth rate increased with the number of oocytes retrieved to approximately 16-20 oocytes after which the LBR continued to increase but with diminishing returns. At the other end of the spectrum, they found that the live birth rate showed a statistically significant falling trend with the decrease in the number of oocytes, showing odds ratio of LBR of 6.66 with 6-10 oocytes and 0.30 with 0-5 oocytes compared to an OR of 1.0 with 11-15 oocytes.[9]

Wang et al also sought an association between the number of oocytes retrieved and the cumulative live birth rate in different female age strata. They evaluated 17,931 women undergoing IVF and grouped them by age and the number of oocytes retrieved. They found that while the number of oocytes retrieved and good quality embryos formed was lower, the fertilization rate was higher in women >35 years, but the pregnancy rate and live birth rate was higher in women <35 years. They concluded that both age and number of oocytes retrieved are factors which independently affect the live birth rate. In women $\leq$35 years, ideally >6 oocytes need to be retrieved while in women $\geq$ 38 years, >14 oocytes need to be retrieved for a successful outcome.[4]

Sunkara examined the real-world evidence (RWE) regarding the association between the number of oocytes and IVF outcomes. She analysed data from 3 large studies, one from the UK involving 4,40,135 IVF cycles, as mentioned above, another from the SART (Society for assisted reproductive technology) involving 2,56,381 IVF cycles and one from Sweden involving 39,387 IVF cycles. All three studies found a non-linear association between the number of oocytes and live births with an initial increase in positive IVF outcomes with increasing oocyte numbers and then a subsequent decline.[10]

In our study too, inspite of the ethnic variation of study population, there was a non-linear relation between age, oocyte yield and clinical pregnancy outcomes. While in women <25 years, a low CPR (31%) was seen even though the number of oocytes retrieved was high (~9-10 oocytes). However, between 26-35 years, the CPR improved (38-39%) even though the number of oocytes retrieved remained similar. In older women (>35 years), the average oocyte yield fell (≈5-7 oocytes). There was a significant drop in blastulation rate (34%) and CPR (14%) in this age group, suggesting an age-related decline in both quantity and quality of oocytes.

Our findings are also similar to Wu et al who conducted a retrospective study on 6,606 women and found that while there are no significant differences in number of oocytes retrieved, very young women (<25 years) had poorer fertilization, pregnancy and live birth outcomes.[11] Similarly, Shingshetty et al in their review of literature

found that the highest live birth rates (LBRs) were observed in women aged 25-30 years, with a steady decline from 35 years onwards except for women aged <25 years. These studies further corroborate our findings that IVF success is low at the extremes of age (<25 and >36 years), with maximum success between 26-35 years age.[1]

Minimum oocyte number in each age strata for IVF Success

There is no dearth of evidence to exemplify the fact that the cumulative live birth rate increases with the increase in number of oocytes retrieved. However, the dilemma arises when the clinician is faced with poor response to stimulation and very few oocytes are retrieved. The question which then arises is the minimum number of oocytes required at a particular age to achieve a successful outcome.

Lebovitz et al conducted a study to evaluate the reproductive outcome in patients demonstrating a poor ovarian response as per the Bologna criteria. They evaluated 751 IVF/ICSI cycles in which ≤3 oocytes were retrieved and found that the pregnancy rate and live birth rate were significantly higher among patients <40-years age, as compared to patients >40 years.[12]

Eftekhar et al conducted a study to evaluate the ART outcomes in the different subgroups of poor responders as per the Poseidon criteria. They evaluated 245 women and found no significant difference in the fertilization and implantation rate among the four subgroups. However, the pregnancy rate and live birth rate were significantly higher in groups 1 and 2, compared to groups 3 and 4.[13] These findings by Eftekhar et al are further corroborated by Morin et al who demonstrated that a fertilized oocyte retrieved from a young poor responder patient (<38 years) is equally likely to form a good quality euploid blastocyst and result in live birth compared to age matched normal responder.[14]

Rodríguez-Varela et al conducted a retrospective study on 2660 IVF cycles to estimate the minimum number of mature MII oocytes needed to obtain at least one euploid blastocyst according to female age. They found that the mean number of MII oocytes needed to obtain one euploid blastocyst increased with age, with 4.9 oocytes required at age 35 years, 5.9 at 36 years, 12.2 at 40 years, 22.8 at 42 years and 39.7 at 43 years.[15]

In our study, the MII cut-offs were obtained by using the logistic regression analysis and ROC curves. The results obtained were contradictory to what has been reported in literature. In our study, minimum number of MII oocytes required in various age groups decreased with increasing age ranging from 9.5 at 21-25 years, 7.5 at 31-35 years and 4.5 at 36-40 years but it increased to 5.5 at >40 years.

Our findings suggest that while the number of mature oocytes is an important predictor of IVF success, it does not fully account for clinical pregnancy outcomes. It demonstrated that in younger women, higher numbers of mature (MII) oocytes are required to maximize pregnancy probability, reflecting the combined influence of oocyte quantity and quality. In older women, even a small number of mature oocytes substantially increases the likelihood of pregnancy, consistent with age-related decline in oocyte quality. The modest area under the curve (AUC) values from ROC analysis suggest that other factors, including embryo quality, endometrial receptivity, and sperm parameters, contribute significantly to IVF outcomes.

Overall, the results demonstrate that maternal age critically influences IVF success: while younger women benefit from both higher oocyte quantity and quality, older women, despite having fewer oocytes, may maintain high maturation rates, with oocyte quality playing a more decisive role than quantity in achieving pregnancy. The declining AUCs with increasing age indicate that MII count alone cannot fully predict clinical pregnancy in older women, highlighting the importance of additional factors.

CONCLUSION

While the total number of oocytes retrieved declined with advancing age, the median number of mature oocytes was relatively stable across the age groups. The data across all tables consistently demonstrate an age-dependent decline in reproductive efficiency. Even though the fertilization efficiency was found to remain largely unaffected by age, the subsequent stages of embryo development, implantation and clinical pregnancy rate declined with advancing age. This emphasizes that age is a key factor, impacting oocyte numbers directly and CPR indirectly.

The minimum number of MII oocytes required for a successful outcome in the various age groups decreased with increasing age ranging from 9.5 at 21-25 years, 7.5 at 31-35 years and 4.5 at 36-40 years but it increased to 5.5 at >40 years. Thus, in younger women, higher numbers of mature (MII) oocytes are required to maximize pregnancy probability, reflecting the combined influence of oocyte quantity and quality. In older women, even a small number of mature oocytes substantially increases the likelihood of pregnancy, consistent with age-related decline in oocyte quality. Thus, while oocyte count matters, it is not the sole driver of pregnancy outcomes, with several other factors, including embryo quality, endometrial receptivity, and sperm parameters, contributing significantly to IVF success.

A non-linear relation between age, oocyte yield and clinical pregnancy outcomes was observed with women aged 26-35 years showing the most favorable IVF outcomes and low success rates at the extremes of reproductive age (<25 years and >36 years). This emphasizes the importance of early fertility planning and consideration of fertility preservation strategies for women considering a delay in conception.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee (F.1/IEC/IFS/2025/No.10, Dated: 06/02/2025)

REFERENCES

1. Shingshetty L, Cameron NJ, Mclernon DJ, Bhattacharya S. Predictors of success after in vitro fertilization. Fertil Steril. 2024;121(5):742-51.
2. Kan A, Leung P, Luo K, Fay L, Tan C. Do Asian women do as well as their Caucasian counterparts in IVF treatment: Cohort study. J Obstet Gynaecol Res. 2015;41:946-51.
3. Patel AP, Patel JA, Cruz M, Gupte-Shah A, Garcia Velasco JA, Banker MR. Ethnicity is an independent predictor of IVF-ICSI outcome: a study of 5,549 cycles in Spain and India. Gynecol Endocrinol. 2016;32(10):819-22.
4. Wang P, Zhao C, Xu W. The association between the number of oocytes retrieved and cumulative live birth rate in different female age strata. Sci Rep. 2023;13:14516.
5. Tur-Kaspa T, Lambe-Steinmiller J, Trowbridge D, Levrant S, Zoneraich N, Zhang JX. Oocyte maturity rate is an age-independent predictor of blastocyst development and euploidy rates: a multicenter retrospective study. J IVF-Worldwide. 2024;2(4):10-17.
6. Sunkara SK, Rittenberg V, Raine-Fenning N, Bhattacharya S, Zamora J, Coomarasamy A. Association between the number of eggs and live birth in IVF treatment: an analysis of 400 135 treatment cycles. Hum Reprod. 2011;26:1768-74.
7. Polyzos NP, Drakopoulos P, Parra J, Pellicer A, Santos-Ribeiro S, Tournaye H, et al. Cumulative live birth rates according to the number of oocytes retrieved after the first ovarian stimulation for in vitro fertilization/intracytoplasmic sperm injection: a multicenter multinational analysis including ~15,000 women. Fertil Steril. 2018;110:661-70.e1.
8. Bahadur G, Homburg R, Jayaprakasan K, Raperport CJ, Huirne JAF, Acharya S, et al. Correlation of IVF outcomes and number of oocytes retrieved: a UK retrospective longitudinal observational study of 172 341 non-donor cycles. BMJ Open. 2023;13(1):e064711.
9. Fanton M, Cho JH, Baker VL, Loewke K. A higher number of oocytes retrieved is associated with an increase in fertilized oocytes, blastocysts, and cumulative live birth rates. Fertil Steril. 2023;119(5):762-9.
10. Sunkara SK. Number of oocytes and IVF outcomes: Real-world evidence. Best Pract Res Clin Obstet Gynaecol. 2023;89:102341.
11. Wu LH, Humm KC, Dodge LE, Sakkas D, Hacker MR, Penzias AS. IVF outcomes are paradoxically poorer under age 25. Fertil Steril. 2012;98(3):S264.
12. Lebovitz O, Haas J, Mor N, Zilberberg E, Aizer A, Kirshenbaum M, et al. Predicting IVF outcome in poor ovarian responders. BMC Womens Health. 2022;22(1):395.
13. Eftekhar M, Mirhashemi E, Tabibnejad N. Outcome of assisted reproductive technology in different subgroups of poor ovarian responders fulfilling the POSEIDON criteria. Middle East Fertil Society J. 2018;23:1.
14. Morin SJ, Patounakis G, Juneau CR, Neal SA, Scott RT, Seli E. Diminished ovarian reserve and poor response to stimulation in patients <38 years old: a quantitative but not qualitative reduction in performance. Hum Reprod. 2018;33(8):1489-98.
15. Rodríguez-Varela C, Mascarós JM, Labarta E, Silla N, Bosch E. Minimum number of mature oocytes needed to obtain at least one euploid blastocyst according to female age in in vitro fertilization treatment cycles. Fertil Steril. 2024;122(4):658-66.

Cite this article as: Grover AM, Bhatia V, Malik S. Oocyte count at retrieval as predictor of pregnancy rate in different age groups in the Indian population. Int J Reprod Contracept Obstet Gynecol 2026;15:4018-25.