

## Increasing Trends of In Vitro Fertilization Worldwide

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Human reproduction has been redefined since the clinical introduction of In Vitro Fertilization (IVF) in 1978. Initially the only indication of IVF was to help the infertile couple to give a child. However, IVF has now been rapidly expanding its horizon including medical & genetic conditions, and fertility preservation. Infertility remains the main target for IVF utilization. Interestingly, the number of IVF babies born each year is increasing tremendously. This has been attributed to the increased number of IVF cycles throughout the world over the past decades.

Diversified social problems & changing demographics are the main parameters for increased IVF utilization. A better access of women, as well as effective contraception has contributed to progressively delayed child bearing & overall lower fertility rates worldwide. The average age at first birth now exceeds 30 years in most of the developed countries which was well beyond the peak fertility age in mid 20s. As a result, a large number of women is delaying childbearing to a point where age related fertility decline contributes to the prevalence of infertility & subsequently increasing the demand of IVF & oocyte cryopreservation.

Definitely the utilization of IVF is closely related to affordability & accessibility. Economic development in many of the developing countries has been tremendous over the last decade. This has helped many childless couple to afford and avail the opportunity of IVF. Increasing number of trained fertility specialists, embryologists and opening up of new IVF clinics have contributed significantly in increasing the number of IVF babies. Wide availability of ovulation induction drugs, gonadotropin injections, low cost ultrasound devices as well as different low cost protocols have encouraged the patients to go for IVF at a relatively cheaper cost than before.

Possibly technological development in the form of automation & miniaturization of the IVF laboratory has increased the IVF access to many<sup>1</sup>. The basic steps in the IVF laboratories include:

1. Identification & separation of sperm & oocytes.
2. Fertilization
3. Embryo culture.
4. Embryo selection for transfer.
5. Cryopreservation of surplus embryos & gametes.

Technical advancements including microfluids sperm sorting devices, advanced ICSI machines with precise micromanipulators, introduction of the time lapse incubators (Embryoscopes), liberal use of preimplantation genetic diagnosis (PGD) of trophoectoderm cells of blastocyst stage embryos as well as high class IVF labs equipped with HEPA filters & CODA filters are now being used in most of the developed IVF laboratories<sup>2,3</sup>. Cryopreservation of sperm, oocyte & embryos has become a standard practice providing opportunities to go for repeated frozen embryo transfer (FET cycles). It not only increases the the success rate of IVF cycles but also helps the patient to go for repeated trial at a low cost. Vitrification has become the dominant method for oocyte cryopreservation and is now being practised liberally worldwide.

Oocyte & ovarian tissue cryopreservation are now used in patients at risk to develop premature ovarian insufficiency (POI) due to gonadotoxic chemotherapy for cancer. Culture systems have advanced to a point where primordial follicles residing in ovarian cortical tissue can undergo activation, growth and in vitro maturation to produce Metaphase II (MII) oocytes<sup>4</sup>.

The increasing trends of utilization of IVF will possibly play a significant role in a substantial proportion of human population worldwide in near future. There is a speculation that nearly 10% of all children will conceive through IVF in many countries

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in coming years. Many educated and professional women are deferring pregnancies. But the economic solvency of the couple as well as technical advancements in Assisted Reproductive Technology (ART) laboratories will possibly motivate & inspire more & more couple to avail the opportunity of IVF to complete their families. Male partner problem like azoospermia or severe oligoasthenospermia, female partner problems like bilateral tubal block or severe endometriosis now have a solution through IVF. Fertility preservation techniques for couple undergoing chemotherapy or who wish to defer pregnancies, IVF offers a new hope for them. The techniques involved sperm freezing, oocyte freezing, embryo freezing and ovarian tissue freezing has taken IVF to a new height beyond only reproduction.

#### References:

1. Kushnir VA, Smith GD, Adashi EY. The Future of IVF: The New Normal in Human Reproduction. *Reproductive Sciences*. 2022, Jan. <https://doi.org/10.1007/s43032-021-00829-3>.
2. European IVF-monitoring consortium (EIM) for the European society of human reproduction and embryology (ESHRE), Wyns C, Bergh C, et al. ART in Europe, 2016: results generated from European registries by ESHRE. *Hum Reprod Open*.2020;2020(3):hoaa032. <http://doi.org/10.1093/hropen/hoaa032>
3. Datta AK, Maheshwari A, Felix N, Campbell S, Nargund G. Mild versus conventional ovarian stimulation for IVF in poor responders: a systemic review and meta-analysis. *Reprod Biomed Online*. 2020;41(2):225-38. <https://doi.org/10.1016/j.rbmo.2020.03.005>.
4. McLaughlin M, Albertini DF, Wallace WHB, Anderson RA, Telfer EE. Metaphase II oocytes from human unilaminar follicles grown in a multi-step culture system. *Mol Hum Reprod*. 2018;24(3):135-42. <https://doi.org/10.1093/molehr/gay002>.