



Reproductive Medicine: A Challenge to Implicate



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Introduction

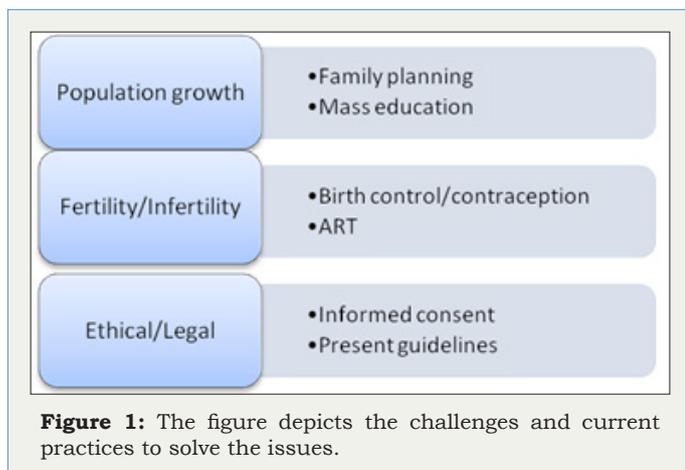
The world population is steeply increasing at the rate of around 1.07% per year. With this growth rate, the human population is going to touch 7.7 billion [1]. This figure has been emerging in the periphery growing infertility cases in both males and females as well. It is estimated that about 15% of couples have been suffering from the said problem [2]. The scenario is even more complex because males are solely responsible for 20-30% of these cases and the overall contribution towards infertility is 50%. It is also to be noted that the so-called percentage has been calculated using the hypothesis that females contribute 50% in overall cases of infertility. So, the reports on male infertility is based on the data collected by the cases on female infertility. The figure does not accurately represent entire regions of the world because we haven't enough data on the rate of male infertility [2,3]. This note will encompass the ongoing problems associated with infertility/sub-fertility together with reproductive dysfunction and the lime light furnished by the reproductive medicine to tackle and overcome these problems. Reproductive Medicine basically deals with fertility preservation, diagnosing and treating the problems of infertility, and other reproductive issues. It also handles major discipline like family planning, puberty, menopause and sexual education. To overcome the challenges and find the solutions, it has got multi-directional scopes which are depicted in the (Figure 1).

Assessment Methods

The current practices involve the following assessment methods: Laboratory screening, medication, surgery, counseling, life style changes and mass education.

Present scenario

The technique of *in vitro* fertilization was reported in 1978 in the UK. Now, it has elapsed 40 years; ART (Assisted reproductive technology) has witnessed the birth of nearly 8 million babies worldwide [4]. This figure is a cumulative outcome of IVF (*In vitro* fertilization) and other fertility treatments and it is just an estimate by an international committee, ICMART (International Committee for Monitoring Assisted Reproductive Technologies). Contrary to developed countries, in developing countries, there are no strict guidelines and legal framework and the number of ART cases like IVF and ICSI (Intracytoplasmic sperm injection) has been increased rapidly. For example, the actual number of ART clinics running in different cities of India outnumbered the ART clinics which are enrolled under National Registry of ART Clinics and Banks in India, Indian Council of Medical Research. This situation is responsible for unnecessarily large number of ART procedures (particularly ICSI) practicing by the health care professionals on individuals/couples. Clinical data shows that ICSI resulted in a smaller number of live births compared to IVF when male infertility was not the problem. The ICSI was developed for the treatment of male infertility but it is approaching 100% in the Middle East and a few countries of the world. The world report covered for the years 2008, 2009 and 2010 highlighted that in 2010 there were 220,000 IVF treatments, but there were more than 455,000 ICSI treatments in the world. In Asian countries, ICSI practices were 1.4 times of IVF and the same is different in different regions of the world; starting from 2.7 times in North America, 6 times in Latin America and more than 60 times in Middle East [5,6]. The national summary report 2016 compiled by Centers for Disease Control and Prevention, USA summarized the outcomes of all 463 fertility clinics stated that out of 263,577 ART cycles, only 75 % succeeded to transfer at least one embryo. These 75% (197,737) of total cycles ultimately resulted into 65,969 live births [7].



Etiology and challenges

Male infertility is the least understood problem of young males. The problems have been suspected at the genetic level which results into spermatogenic failure. Genetic problems forced us to move towards one side of the pole and the treatment options are available on the other side of the pole of the circle in which problems are entangled. Gene editing is the only option available to traverse and cross the barrier of etiology, but it is still far from reality even in coming years at least for human subjects. Scientists have been successfully rectified the culprit genes responsible for fertility issues in mice but when we consider the humans, the first challenge is not technical, but it is legal and of course ethical. The question of ethical issues has been with us when researchers put the ideas of embryo manipulation in the lab.

Overcoming the challenges

For the genetic issues, we must wait for a legal framework which will cover the guidelines for manipulating the human embryos at the genetic level. The day-to-day encountered problems have already been rectified by medicine. Most of the common problems fall under the category of hormonal imbalance and for that there is medicines available over-the-counter following doctor's prescription.

Abnormality in testosterone production is one reason in the etiology of male infertility [8]. The degree of infertility in male comprises the situation of azoospermia to oligozoospermia. Azoospermia is the extreme case in which there is complete absence of spermatozoa. The options available to treat azoospermia patients are not hopeful if someone wants to father a child. On the other hand, oligozoospermia can be treated by several methods which include life style changes, nourishments, hormonal balance and education. The treatment is already revolutionized by the ART processes; particularly the use of ICSI increases the chance of infertile males to father children [9]. On the other hand, infertility problem in females results in problems with ovulation, damage to fallopian tubes or uterus, problem in cervix etc. [10]. Aging is also a contributing factor in female infertility. But the good news is that ART is equally applicable in female candidates in the form of IVF, ICSI and ET (Embryo Transfer). The major practices under the ART comprise with the following methods/techniques as mentioned in (Table 1).

Apart from that, pre-implantation genetic diagnosis is also conducted on embryos prior to implantation.

Finally, even if we succeeded to discover new technique; the challenge of ethical/legal concern has raised. Despite of informed consent from the individuals/couples, there is no direct law which includes the human subjects for manipulation at genetic level to cure infertility/subfertility/sterility with the help of reproductive medicine (Table 1). The ethical issues are off course the major obstacles in implementing the whole techniques for the benefit of human civilization. We are already facing the process of posthumous

reproduction. This technique has been available since 1950s, but experts have been facing regional and religious issues. There is no doubt that posthumous reproduction is an excellent idea which allows an option for fathering children in the event of sudden injury or death as these events are very common for astronauts and soldiers [11-13].

Table 1: Table shows current practices and techniques accompanied ART.

Techniques	Accompanied by
A. IVF (<i>in vitro</i> fertilization)	A. Transvaginal ovum retrieval and embryo transfer (ET)
B. Intracytoplasmic sperm injection (ICSI)	B. TESA/TESE (Testicular / Epididymal Sperm Aspiration or Extraction)
C. Zygote intrafallopian transfer (ZIFT)	C. In connection with IVF
D. Egg and sperm donation	D. Consent process

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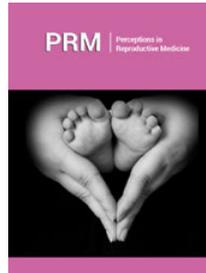
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