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Original Research Article

Gender dynamics in IVF: uncovering male and female factors for IVF at a tertiary care hospital

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ABSTRACT

Background: In spite of the global burden of subfertility affecting 8 to 12% of reproductive aged couples worldwide, not all sub fertile couples require in vitro fertilization (IVF). The decision to pursue IVF is typically based on a thorough assessment of the couple's fertility challenges. Initially developed as a way to bypass irreparable tubal disease, IVF is now widely applied for treatment of infertility due to a variety of other causes. Latest achievements in the field of assisted reproduction have led to a rapid expansion in the indications of IVF. The objective of the study is to ascertain the various indications for which IVF was offered in the ART Centre of a public sector hospital, where such facilities are offered free of cost.
Methods: This cross-sectional retrospective study was carried out over a period of 3 years in a tertiary care public sector hospital. Medical records including the infertility data of 1934 couples who underwent IVF cycles during the study period was analysed.
Results: Of the 1934 couples taken up for IVF, 379 (19.6%) couples were for male factor only, 14.7% underwent IVF for chronic anovulation and 478 (24.7%) couples underwent IVF for combined male and female factors while 14.6% for idiopathic infertility.
Conclusions: Both male and female factors contribute vividly to the burden of infertility and result in IVF to attain a successful pregnancy. In our study combined factors was the commonest indication for IVF.

Keywords: IVF, Male infertility, Female infertility

INTRODUCTION

The pioneering work by Sir Robert Edwards and Patrick Steptoe in 1978 which led to the advent of IVF (in vitro fertilization), revolutionized the field of reproductive endocrinology and infertility and has fulfilled the dreams of more than 5 million sub fertile couples since then.[1,2] IVF when initially came into existence; was considered the treatment modality for bilateral tubal blockage but subsequently its usage broadened. The five main conditions which mandatorily require IVF are: bilateral blocked fallopian tubes, endometriosis of advanced stage resulting in tubal disease or dysfunction, significant male factor infertility, compromised ovarian states like premature ovarian failure requiring egg donation, and in clinical scenarios mandating pre- implantation screening, to prevent genetically inherited disease.[3] Certain other conditions like anovulatory infertility, uterine factor infertility, unexplained infertility and inability to have intercourse may also require IVF but for these; IVF need not be a first modality of choice but other options both medical and surgical may be offered before going for IVF.[3]

Infertility which continues to be a highly prevalent global condition affects between 8 to 12% of reproductive-aged couples worldwide and burdens nearly 10–15% of married couples in India, with 27.5 million couples seeking treatment for this problem.[4,5] The contributory factor to infertility has been categorised as: 35% of the cases due to female factors, 35% by male factors, 20% due to combined factors, and 10% by unknown reasons. In spite of the global burden of subfertility not all sub fertile couples require IVF. The importance of IVF for blocked fallopian tubes and severe male factor infertility is indisputable, where even a live birth rate of 20-30% per cycle offers the only chance of conception but in cases with unexplained infertility, anovulatory infertility evidence for upfront IVF is unclear.[6]

Most of the studies and work have revolved around ascertaining the causes of infertility in couples presenting to fertility centres for conception but not on ascertaining the myriad indications for which IVF has been done at private or public reproductive units. With this background information we carried out a cross sectional study to ascertain the various indications for which IVF was offered at a public sector hospital where the assisted reproductive procedures are offered free of cost. Knowing the profile of patients that require these services is paramount, as it guides the structuring and development of effective public initiatives to improve healthcare in the reproductive arena especially in a setup where there are no clinician biases as no financial implications for fertility specialists or the institutes are involved.

METHODS

Study design and setting

This cross-sectional qualitative descriptive observational retrospective study was carried at the Assisted Reproductive Technology (ART) centre of a tertiary care public hospital providing all health care including fertility services to its dependants and families free of cost.

Study population

This study was carried out over a period of 3 years from 01 April 2019 to 31 March 2022 on 1934 sub fertile couples who presented with inability to conceive after regular unprotected intercourse for a period greater than one year.

Data collection

The medical records including the infertility data of 1934 couples were analysed after obtaining approval from the institutional review board and the hospital ethical committee. We analysed the history and treatment records of every couple from the first to the last consultation at the service who underwent assisted reproduction. If any data was incomplete or the patient was lost to follow up the patient was excluded from analysis.

The couple's medical charts were analysed for epidemiological data including age; duration of infertility, occupation, smoking, drinking, type of infertility i.e. primary or secondary and associated comorbidities. To analyse the cause of infertility the investigation protocol of both the partners were assessed and endorsed.

Female factor infertility

To evaluate the female partner and assess the female factor fertility; hormonal profile including Follicle stimulating hormone, luteinizing hormone, antimullerain hormone, thyroid profile and serum prolactin were done, baseline haematological and biochemical investigations, imaging studies in the form of hysterosalpingography, ultrasonography were analysed and diagnostic hystero-laparoscopy if carried out.

Based on the clinical examination and the results of the various diagnostic tests the female factors of infertility were classified into tubal factors, uterine factors, decreased ovarian reserve (DOR), polycystic ovarian syndrome (PCOS) and endometriosis.

Male factor infertility

To assess the male fertility status semen analysis of each male partner was analysed wherein two samples taken 4 to 6 weeks apart was studied. The seminal parameters had to be analysed as per the WHO 2010 guidelines.[7] Males with semen parameters below the WHO normal values were considered to have male factor infertility. The most significant abnormalities which were generally encountered were: low sperm concentration (oligozoospermia), poor sperm motility (asthenozoospermia), abnormal sperm morphology (teratozoospermia) and no live or dead spermatozoa (azoospermia). Oligospermia was further categorised as Mild oligospermia with 10 to 15 million sperm/ml; Moderate oligospermia with 5 to 10 million sperm/ml whereas Severe oligospermia was diagnosed when sperm counts varied between 0 and 5 million sperm/ml. Azoospermia which signifies absence of live or dead spermatozoa on two centrifuged samples were further categorised into obstructive azoospermia(OA) and non-obstructive azoospermia(NOA) based on the clinical examination and hormonal profile of the male partner as it changed the counselling and the treatment modality of the couple.

Unexplained infertility

If the cause of infertility in couples could not be categorised into any of the above factors or all the basic evaluation was normal, then they were classified in unexplained infertility group.

Combined factor infertility

If an abnormality was detected in both the partners, they were classified into combined factor infertility.

Statistical analysis

Details of cases were recorded on a structured format and analysed with the help of registered version of Statistical Package for the Social Sciences (SPSS) version 26.

RESULTS

The demographic profile of the 1,934 couples who presented to our centre over the three-year study period is depicted in Table 1 which revealed the mean age of the females to be 29.3 years while that of the males as 32.8 years. Of the 1934 couples one thousand three hundred fifty (69.9%) couples had primary infertility, while the remainder five hundred eighty-four (30.1%) had secondary infertility.

On ascertaining the causes of infertility for which the couples were subjected to an IVF cycles; 380 (19.6%) couples had male factor only, 794 (41%) couples had female factor only for infertility of which the most common indication was PCOS. 478 (24.7%) couples had combined male and female factors infertility and in 282 (14.7%) couples the cause of infertility was not identified (Figure 1). Among those where cause of infertility couldn't be broadly classified i.e. in the 282 couples the other significant parameters which could be seen were: 170 females (45%) had hypothyroidism as medical condition which was an incidental finding during infertility evaluation. Out of 1934 couples who underwent IVF treatment, 2 persons (0.05%, one couple) had HIV infection and were on HAART, 26 individuals (1.3%) had chronic hepatitis B infection, 8 persons (0.4%) had chronic hepatitis C infection.

Table 1: Demographic profile of the study population (1934 couples).

Age in years and duration of Infertility variables				
Variable	**Mean**	**SD**	**Lower range**	**Upper range**
Females	29.3	4.1	21	43
Male	32.8	4.0	21	47
Duration of Infertility	3.9	1.6	2.4	3.9

Table 2: Types of male factor infertility.

Semen parameter	Individuals	Percentage (%)
Asthenospermia	437	50.9
Oligospermia	142	16.6
Severe oligospermia	117	13.6
Oligoasthenoteratospermia	38	4.4
Non-obstructive azoospermia	48	5.6
Obstructive azoospermia	76	8.9
Total	858 (44.4% of 1934 couples)	

Table 3: Hormonal profile of the women who underwent IVF cycle.

Hormone	Range	Mean	Standard deviation
Luteinizing hormone (IU/l)	0.1-51	5.8	±4.8
Follicle stimulating hormone (IU/l)	0.1-41	6.1	±3.4
Anti-mullerian hormone (ng/ml)	0.01-28	4.5	±3.9

Table 4: Indications for IVF in the study population.

Etiology of infertility	No. of couples (%)
Seminal factor	379 (19.6)
Decreased ovarian reserve	154 (8.2)
Polycystic ovarian syndrome	285 (14.7)
Endometriosis	95 (4.9)
Tubal factors	198 (10.2)
Uterine factors	63 (3.3)
Combined factors	478 (24.7)
Unexplained	282 (14.6)
Total	1934 (100)

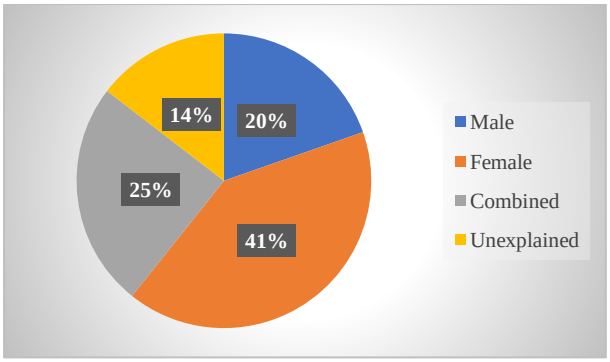

Figure 1: Contributors of various factors for infertility in study population.

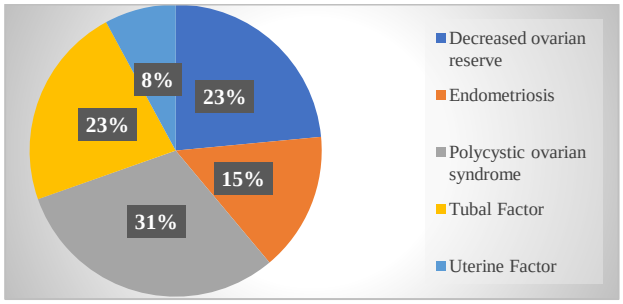

Figure 2: Indications of female infertility for IVF.

The semen analysis of 858 (44.4%) males contributing to male factor infertility (exclusive male and combined factor) were further sub analysed to assess the type of abnormality and asthenozoospermia was the most common finding followed by oligozoospermia.

On sub-analysis of only the female factor infertility it was observed that the most common condition contributing to female factor infertility was PCOS as shown in Figure 2 which was further strengthened by the hormonal assay of the females in the study group who underwent IVF which is presented in Table 3 depicting mean AMH to be 4.5 ng/ml.

The data on sub analysis revealed that the indication for maximum number of IVF cycles in our study group couples i.e. 478 couples were for combined male and female factor followed by exclusive seminal abnormality as seen in 379 couples (24.7 % versus 19.6%) as the female factors like tubal and anovulation were taken separately (Table 4).

DISCUSSION

Infertility is a devastating experience for both the partners trying for parenthood. However, historically and even in present scenario, the woman has to carry the stigma of infertility; notwithstanding that men and women are equal contributors to a couple's infertility. With the development of assisted reproductive technology (ART), the treatment burden for male and unexplained infertility has also fallen mainly on women who suffers both physically and psychologically. Equalizing this burden is of paramount importance so that both partners take the onus and contribute equally towards the various assisted reproductive techniques.

Various studies have been carried out both globally and in India to pinpoint the contribution of each partner to this social and reproductive disease. Previous Indian studies reported 40% of infertility contribution to male factors, 40% by female factors and 20% due to combined factors.[8] According to a multicentric study conducted by WHO from 1982 to 1985, 20% of cases were attributed to male factors, 38% to female factors, 27% had causal factors identified in both partners, and 15% could not be satisfactorily attributed to either partner.[9] Another Indian work documented that among couples seeking treatment, the male factor is the cause in approximately 23%.[10] However all these data reflect the contribution of each factor to the subfertility load of a centre or a nation but not to the number of assisted reproductive procedures carried out.

The ICMART's annual collection of global IVF data had estimated that since the birth of Louise Brown's in 1978 more than 8 million babies have been born from IVF around the world along with the estimates that more than a half million babies will be born each year from IVF and ICSI from more than 2 million treatment cycles performed.[11] In spite of the large number of IVF cycles being performed there is a paucity of data pinpointing the indications for which IVF are offered with the pertinent questions being should IVF be offered to all sub fertile couples or should IVF be the first modality of choice for any cause of subfertility?

With this objective in mind we carried out a cross-sectional descriptive study to analyse the indications for which IVF was carried out at public hospital where the treatment was absolutely free of cost thus eliminating any biases either on the part of the clinician or the fertility centre.

The study over a period of 3 years revealed that overall 41% of 1934 couples had female cause for infertility demanding an IVF cycle with various sub indications. Of the various female factors for subfertility anovulation due to PCOS was the main indication (14.7%) followed by tubal factor. However, on sub analysis of the myriad indications encompassing both the partners for which IVF was offered: 478 couples (24.7%) underwent in vitro fertilisation because of combined factors for both male and female infertility followed by 379 (19.6%) couples having exclusive male factor infertility (Table 4). Unexplained infertility although not considered an upfront indication for an IVF cycle was also seen in 14.6% couples. In a similar study by Polisseni et al the top-three conditions of the 295 patients with established diagnoses for subfertility requiring various ART procedures were: chronic anovulation (n=98; 33%); tubal factor infertility (n=86;

29%); and male factor infertility (n=59; 20%) which corroborates to our finding.[12]

Various national studies have shown that subfertility affects differently in different ethnic groups and inhabitants of different states with 3.7 per cent in Uttar Pradesh, Himachal Pradesh and Maharashtra to 5 per cent in Andhra Pradesh and 15 per cent in Kashmir.[13-15] Again these figures pertain to the burden of subfertility and not how many could avail the most sophisticated of all ART procedure. Our study being from a public care hospital getting infertility referrals from all over the country could be considered a representative population of the country adding to the strength of the study. Including other public hospital providing ART services to further increase the patient population and subdividing them to various ethnic groups could add more data to the literature. Originality is the other strength and data being from a single institute where there were no confounding variables in the form of treatment protocol and the policy regarding the indication for carrying out IVF is also a plus factor about the research.

Although being a first of its kind with a large sample size there are limitations to our study. First, due to the retrospective study design, data were extracted from the medical record system at a single centre. For getting an even more creditable conclusion, we can consider multi-centre, prospective studies, and expand the sample size in order to obtain higher level evidence.

CONCLUSION

The infertility burden is contributed by both male and female factors thus resulting in an IVF cycle to attain a successful pregnancy outcome. However as far as the most common indication for IVF is concerned combined factor (combined male and female factor) was the commonest indication for IVF at our centre. It's imperative to counsel the male partners to offer psychological support to their partners to undergo the roller coaster of IVF.

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