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An evaluation of etiological factors of infertility in a tertiary care teaching institute in Uttar Pradesh

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Abstract
Worldwide, infertility is a problem that has been getting worse, particularly in nations with limited resources. An estimated 60–80 million couples worldwide experience infertility each year; likely 15–20 million of these couples reside in India. The WHO estimates that 3% and 8% of Indians are affected by primary and secondary infertility, respectively. Infertility affects up to 1 in 6 couples in India alone. Infertility is more common and has a complex etiology in India due in large part to cultural, socioeconomic, health care, and environmental variables. Infertility psychological repercussions and social stigma affect not just the infertile person but also the relationship and the family. In our developing country, there is still a great deal of embarrassment surrounding infertility, and women are frequently held responsible for their incapacity to conceive. The majority of infertile women in our study (83.11%) are in the young reproductive age range of 21 to 30 years. This study includes mainly rural population with constitute more than 2/3 (60.77%) of the women presenting in OPD with complain of infertility. Around 78.44% of the couples had 1-5 years of duration of infertility. Early marriage has an impact on early childbirth, and in most situations - especially in developing nations - having children is the primary goal of marriage. In our study addiction was present in 24.15% of male and 73.5% of female. Female factor was major contributing cause of infertility in our study (60.25%), of which ovulatory dysfunction is major cause (35%) followed by tubal block. Oligospermia is leading cause of male infertility in male (8.6%).

Keywords: Infertility, sperm ananlysis, primary infertility, secondary infertility

Introduction
A dandelion is a universal symbol of fertility- the dozens of seeds released by each flower head represents fertility and abundance. Unquestionably, the most common desired goal in adulthood is parenthood. A child completes human subsistence and satisfies the individual's need for procreation in relation to the ultimate objectives of wholeness, contentment, and family unity. However, not every couple that wants to become pregnant will succeed in doing so, and some may need medical support to address underlying reproductive problems.

According to the World Health Organization and the International Committee for Monitoring Assisted Reproductive Technology, the failure to obtain a clinical pregnancy after 12 months or more of regular unprotected sexual activity is what defines infertility (WHO, ICMART). In contrast, demographers define it as the inability of women in their reproductive age (15–49) years to become pregnant after exposure to pregnancy for five or more years Primary infertility is the inability of a woman (who has never given birth before) to become pregnant after a year of unprotected, regular sexual activity. The inability to conceive after at least one previous conception, is commonly referred to as secondary infertility.

Worldwide, infertility is a problem that has been getting worse, particularly in nations with limited resources. An estimated 60–80 million couples worldwide experience infertility each year; likely 15–20 million of these couples reside in India. The WHO estimates that 3% and 8% of Indians are affected by primary and secondary infertility, respectively. Infertility affects up to 1 in 6 couples in India alone.

Infertility is more common and has a complex etiology in India due in large part to cultural, socioeconomic, health care, and environmental variables. Infertility psychological repercussions and social stigma affect not just the infertile person but also the relationship and the family. In our developing country, there is still a great deal of embarrassment surrounding infertility, and women are frequently held responsible for their incapacity to conceive. Many men refuse to be examined, or even to receive medical care. Male and female infertility can result from a

multitude of causes. The attempts to address the issue are hampered by a lack of knowledge regarding the risk factors, accessible treatment choices, and treatment success rates. Treatment for infertility is still a specialty service, and many members of our society cannot afford to visit the specialized facilities that are qualified to offer it. Fewer couples seek treatment or complete the entire course of treatment due to the financial burden of care and the restricted availability of treatment choices, many of which are antiquated and have poor therapeutic outcomes.

Given this situation, infertility has far-reaching effects, including strained marriages, an increased risk of divorce, physical abuse, mental health disorders like depression, social isolation, financial hardship, and a host of other issues.

This study was conducted to evaluate the etiological factors of infertility. The goal of study is to increases knowledge and understanding of the factors that contribute to infertility, risk factor, and social habits that cause infertility. Additionally, the study looked at the causes of primary and secondary infertility in 385 couples who visited a tertiary center.

Materials and Methods

This cross-sectional observational study was conducted in Swaroop rani hospital, Prayagraj in the department of Obstetrics and Gynaecology over a period of 1year from July 2023 to July 2024.

Data was collected from 385 couple attending infertility OPD. The couple's demographic information, married life, employment, use of contraception, menstrual history, and past medical and surgical history were all gathered. The couple's infertility was then classified as primary or secondary, and the results of the clinical examination were noted. Blood samples of infertile women were collected for the hormonal study such as thyroid profile, prolactin, day 2 FSH and LH as indicated. Tubal and uterine pathology were evaluated by ultrasonography hysterosalpingography, laproscopy and hysteroscopy. For men the information related to puberty, cryptorchidism inguinal hernia, testicular inflammation and sexually transmitted diseases have been documented through questionnaire. The semen analysis was performed according to WHO criteria2021, and if it was determined to be abnormal, the male partner was referred to the urologist. The analysis involved the type of infertility and etiological factors and its percentage in result.

Inclusion criteria

The study included infertile couples in whom pregnancy has not been achieved in a year of regular intercourse, diagnosed after full examinations and laboratory tests.

Exclusion criteria

Married couples less than 1 year couples incompletely investigated, suffering from any neurological and psychiatric illness.

Results

1. Distribution based on age

Age	No. of patients	Percentage
21-25 years	210	54.54%
26-30 years	110	28.57%
31-35 years	42	10.9%
36-40 years	18	4.6%
>40 years	5	1.29%

2. Distribution based on Demographic details

Residence	No. of patient	Percentage
Rural	234	60.77%
Urban	151	39.23

3. Distribution of infertility patients according to married life

Duration of marriage	No. of patient	Percentage
1-5 year	302	78.44
6-10 year	61	15.8
>10 years	22	5.71

4. Distribution of infertility patients according to socioeconomic status

SES	No. of patients	Percentage
1	76	19.74
2	112	29.09
3	135	35.06
4	40	10.38
5	22	5.7

5. Distribution of infertility patients on the basis of Addiction

Female	93 out of 385
Male	283 out of 385

No addiction	292	75.85%
Addiction	93	24.15%
Tobacco chewing	82	21.35%
Smoking	11	2.8%

No addiction	102	26.5
Addiction	283	73.5
Alcohol	99	25.7
Smoking	40	10.4
Tobacco chewing	30	7.8
All	114	29.6

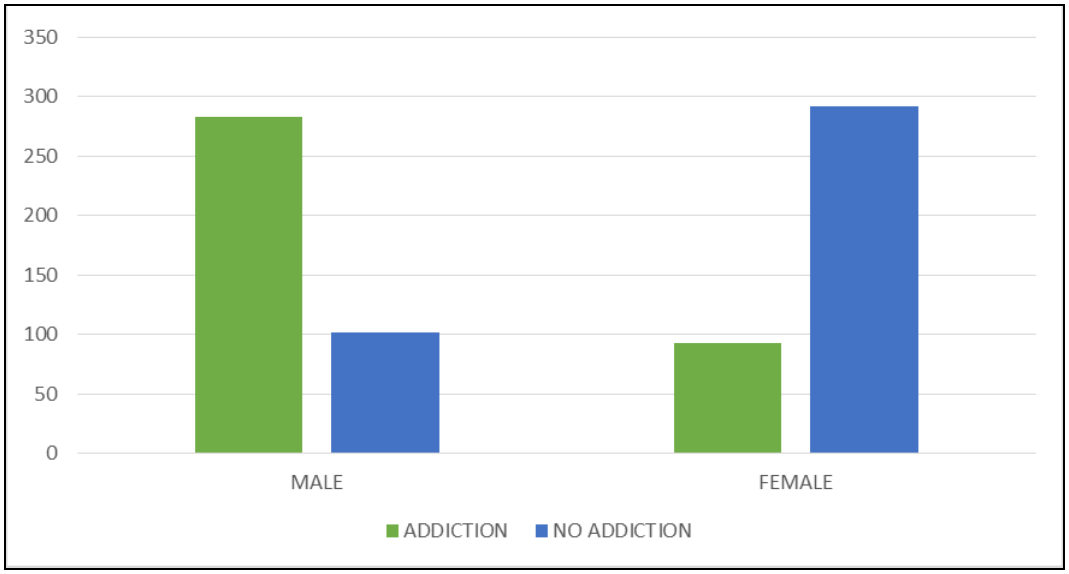

Fig 1: Infertility patients on the basis of Addiction and No addiction

6. Distribution on the basis of factors of infertility

Gender	No. of patient	Percentages
Male	86	22.33
Female	232	60.25%
Combined	36	9.35%
unexplained	31	8.05%

7. Distribution on the basis of female factors of infertility

Causes	No. of patients	Percentage
Ovulatory dysfunction	135	35%
Tubal block (Unilateral/bilateral)	36	9.25%
Endometriosis	8	2%
Uterine anomalies	6	1.5%
Hypothyroidism	27	7%
Premature ovarian failure	4	1%
Ovarian cyst	4	1%
Asherman syndrome	2	0.5%
Genital tuberculosis	10	2.5%
More than one cause	11	2.84%

8. Combined female factors causing infertility

Combined causes	Number	Percentage
Tubal & ovulatory dysfunction	5	1.29
Tubal and ashermann	4	1.03
Tubal and thyroid	1	0.26
Tubal, thyroid uterine anomaly	1	0.26

9. No. of cases with male factor infertility

Causes	Number	Percentage
Azoospermia	23	6.1
Oligospermia	33	8.6
Oligoasthenospermia	21	5.5
Asthenospermia	3	0.7
Varicocoele	3	0.7

Discussion

A major health concern, infertility is caused by pathologies pertaining to the ovaries, fallopian tubes, and endometrium as well as contemporary lifestyle factors such as obesity, stress, and a non-conductive legal framework that prohibits assisted reproduction. The WHO report states that the prevalence of primary infertility in India was 16.8% when using the concept of "age but no birth" and 3.9% when age-standardized to 25–49 years. Primary infertility prevalence rates in affluent countries ranged from 3.5% to 16.7%, whereas in less developed countries they ranged from 6.9% to 9.3%, according to a large population survey conducted by Boivin *et al*. The estimated median prevalence was 9% overall [1].

The majority of infertile women in our study (83.11%) are in the young reproductive age range of 21 to 30 years. Similar findings were noted by Adamson *et al*. in Mysore, where 56% of couples are in the 20–29 age range [2]. Sudha *et al*.'s study also found that 42% of the women were younger than 25 [3]. The female patient's mean age group in this study was 20–30 years, which is also nearly identical to the findings of studies conducted by Obuna *et al*. [6], Sumitha Dutta *et al*. [5], Abbasali *et al*. [4], and Abbasali *et al*. The study suggests that younger marriages in our society may be associated with the predominance of younger reproductive age groups.

Early onset of sexual activity, inadequate attention to personal hygiene, and sexual activity during menstruation are all variables that increase the risk of vaginal germs invading the pelvic cavity and causing pelvic inflammation. The likelihood of developing infertility increases with the age at which sexual activity is initiated and with the percentage of pelvic inflammation. It has also been demonstrated that a woman's age influences the quantity and quality of her eggs. The percentage of persons seeking treatment in order to become parents will rise as they get older.

This study includes mainly rural population with constitute more than 2/3 (60.77%) of the women presenting in OPD with complain of infertility. In developing countries, rural people believes that the consequences due to infertility range from economic hardship to social isolation and violence and many families depend on children for economic survival, especially in old age hence first child matters a lot hence, they seek early treatment and hence the percentage of infertility in rural people within 1-5 years of marriage duration are increased in our study.

Around 78.44% of the couples had 1–5 years of duration of infertility. Similar results were obtained by Shamila and Sasikala [9]. According to a research by Obuna *et al*. on Southeast Nigerians, 46% of infertile couples had experienced infertility for a period of one to five years [6].

They appear in the first year of marriage because, as a couple's marriage lengthens, some may decide to seek infertility treatment, while others may conceive on their own, which could also be the cause of the infertility's longevity. The clinical, epidemiological, and demographic definitions of infertility are all included in this average length of time, which means that most couples present after their odds of naturally conceiving spontaneously have significantly decreased [7].

The majority of patients arrive within five years of getting married. Early marriage has an impact on early childbirth, and in most situations - especially in developing nations-having children is the primary goal of marriage [8].

In the present study, majority of the couples with infertility belonged to Class III socioeconomic status 35.06%. Similar findings were reported by Maha *et al*. where most of the infertile couples 57% belonged to Class III SES [10]. Mittal *et al*. reported that infertility was most prevalent among participants belonging to Class III SES [11]. This reflects that middle-class families cannot afford the expenditure for the treatment of infertility. Patient belonging to higher socioeconomic status easily avail medical therapy like ART and they mainly seek treatment from private sector rather than tertiary center. Higher socioeconomic status also improve living condition and there are less changes of infection causing/ predisposing to infertility and also patient with lower socioeconomic status cannot afford high treatment so they mainly present in tertiary care center.

In our study out of 385 couple, 283 Males (75.85%) have addiction history and 93female (24.15%) have addiction history. Out of 283 addicted male, the main addiction was to alcohol (25.7%) then smoking (10.4%) and to both (29.6%).Out of 93 addicted female 21.35% were addicted to tobacco chewing and 2.8% addicted to smoking.

In males alcohol addiction is the oldest type of addiction. The reason of high infertility in alcohol abuser could be due to decrease spermatogenesis and high serum FSH and PRL and duration-dependent decreased serum T level which could be due to increased oxidative stress that damages Leydig and supporting Sertoli cells and/or through the impaired HPG axis. Alcohol also decreases semen volume, sperm count and motility and increases DNA damage. The mechanism by which tobacco affects male fertility had received considerable attention. Smoking tobacco was also reported to decrease seminal plasma Zn level and Ca^{+2} ATPase that can reduce sperm motility and count, decreases sperm normal morphology decreases acrosome, increases DNA methylation and increase testosterone liver metabolism [12].

Smoking and chewing tobacco in females linked with early menopause and lower levels of ovarian reserve markers. This is because they impair the development and growth of antral follicles through oxidative stress and DNA damage directed by supportive granulosa cells, which causes cytotoxicity and lower-quality oocyte production. It is linked to increased levels of testosterone and decreased levels of progesterone and estrogens. Smoking is linked to an increased risk of oviductal smooth muscle contractility-mediated ectopic pregnancy; delayed implantation mediated by cytotrophoblast proliferation, migration, and invasion; and an increased risk of oligomenorrhea, dysmenorrhea, and menstrual symptoms, though the latter two appear to be unrelated to ovulatory dysfunction [13].

Similar to a study by Chowdhary *et al*. in which female factors reported in 45.8%, male factor in 25.6%, unexplained in 9.8%, and 18.8% in both partners, our study found that female factor was responsible for 60.25 percent of infertile couples, male factor for 22.33%, and no cause could be found in 8.05% of cases. Nayak *et al*.'s investigation produced similar results, with female factors accounting for 60.2% of cases, male factors for 1.5%, combination factors for 19.4%, and unexplained variables for 19.4% [15]. Like our study (57.7%), Aflatoonian *et al*. reported that the primary cause of infertility was a female component.

A comparable study conducted in Nigeria revealed that 42.9% of patients had female-related causes of infertility, 19.7% had male causes, 16.7% had both partners contributing to the infertility, and 20.7% had no conclusive cause [16]. According to a Mongolian study, in 45.8% of instances, the female factor was the cause of infertility, in 25.6% of cases, the male factor was the cause in 18.8% of cases, and in 9.8% of cases, there was no apparent reason for the infertility [17]. Due to social rejection and the fact that only a small percentage of male patients have given their consent for semen analysis, the male factor's low prevalence may be explained.

Infertility was caused by male factor (45%), oligo-ovulation abnormalities (37%) and tubal damage (18%), according to a study by Fathi. In 30.6% of cases, the woman alone had infertility issues, and in 29.2% of cases, the guy alone had them. 20.7% of cases of infertility were unexplained [18].

According to our research, 35% of the women had ovarian pathology identified by USG, and 9.25% of the women had blocked tubes in one or both tubes on HSG, which is consistent with Fethi's findings [18]. Tubal factor emerged as the second most common cause of infertility in women in a study conducted in Sari, Iran [19].

Tubal factor in 9.25% of cases of infertility was leading cause followed by subclinical/clinical hypothyroidism accounting for 7% of cases and endometriosis for 2% of cases. Endometriosis is a non-cancerous disorder that can cause adhesions to form between the uterus, ovaries, and fallopian tubes. These adhesions hinder the egg from being transferred to the tube, leading to infertility. The aforementioned data corroborates the study Tomassetti *et al*.'s conclusions that endometriosis is one of the tubal and peritoneal variables important in infertility [20].

Uterine anomalies were seen in 1.5% of female infertility patients in our study. The primary cause of infertility in genital tuberculosis (GTB) is tuberculosis of the fallopian tubes, along with endometrial involvement. Infertile populations in underdeveloped nations have a prevalence of GTB of between 5 and 20%; our study found a similar outcome, with 10 out of 232 infertile women having GTB [21].

According to a study by Sudha *et al*., throughout a 12-year period of infertility, there are more cases of tubal block (58.85%) and 53.45% ovulation problems. A significant reason of anovulation is hormonal imbalance [22]. According to Gohill *et al*., women with hormonal imbalances won't create enough follicles to guarantee the development of an ovum [23]. Uterine anomalies were seen in 1.42% of the female infertility patients in the current study. Uterine anomalies have been reported in 2-3% of fertile women in a research study, despite the fact that the uterine factor is the cause of recurrent pregnancy loss and preterm delivery. Other studies have also indicated that congenital anomalies, like a septate uterus, can result in recurrent miscarriages or infertility [25]. Fallopian tube tuberculosis, with endometrial involvement, is the primary cause of infertility as proved in many study [26].

According to World health organization definition asthenospermia is decreased sperm motility less than 50% of total sperm. Varicocele can result in elevated testicular temperature as well as the reflux of hazardous adrenal vein metabolites into the left kidney. The main male variables that contributed to infertility in our study were varicocele, necrospermia, azoospermia, and oligospermia. In contrast to our

study, Shiraz, Iran, found that varicocele was the most common cause of infertility among men attending infertility clinics. Out of 385 infertile couples, 0.7% of the males had varicocoele. Our study's prevalence of infertility without a known cause was 8.05%, which is lower than the 20.7% reported in a study by Farhi J *et al*. [27].

Conclusion

Before beginning intensive infertility treatments, each couple should have appropriate counseling and investigation, as one or both genders may be at blame for infertility. Resolving the issue will involve the medical and socioeconomic assistance of infertile women, including information, greater social support, and easier access to medical care. Research on the etiological pattern of infertility was less. Thus, the purpose of this study is to determine the clinical pattern and underlying etiology of infertility among married infertile couples attending OPD in tertiary care center. According to our research, female variables account for the majority of cases of female infertility, but male factors also play a key role in a considerable number of cases.

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Conflict of Interest

Not available

Financial Support

Not available

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