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Causes of Female Infertility in Muzaffarnagar Medical College IVF Centre

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Abstract: ***Introduction: Infertility is a medical condition affecting a person's ability to conceive, with female infertility being particularly common. Women are diagnosed as infertile based on age and the duration of unsuccessful attempts to conceive. Factors contributing to female infertility include age, hormonal imbalances, medical conditions such as PCOS, endometriosis, and lifestyle choices, including smoking, excessive alcohol consumption, and obesity. Female infertility can be categorized into primary and secondary types. It is a global health issue affecting at least 10% of women, with the risk increasing with age. Timely diagnosis and treatment are essential for those struggling to conceive. Aim and Objective: Aim: To investigate and identify the primary causes of female infertility in patients attending the IVF Centre at Muzaffarnagar Medical College and to understand the factors contributing to infertility in this region. Objectives: To determine the prevalence of female infertility in patients at the IVF Centre of Muzaffarnagar Medical College. Materials and Methodology: This cross-sectional observational study will assess the prevalence and causes of female infertility among patients at the IVF Centre in Muzaffarnagar Medical College, Uttar Pradesh, India. The study will run from January to December 2025, involving 100 women aged 18-45 years seeking infertility treatment. Women with a history of hysterectomy, bilateral oophorectomy, or those not consenting will be excluded. Data will be collected through structured interviews, medical records, and diagnostic tests like hormonal assays, ultrasound imaging, and laparoscopy. Descriptive statistics will summarize the data, and inferential tests (Chi-square, t-tests) will examine the relationships between infertility and risk factors. Results: The study found that the prevalence of female infertility increases with age, with 11% in the 18-25 age group, 18% in the 26-35 group, and 31% in the 36-45 group. Socio-economic factors revealed a higher infertility prevalence among low-income women (29%) compared to medium (19%) and high-income (12%) women. The main causes of infertility were ovulatory dysfunction (23%), unexplained infertility (31%), uterine factors (21%), and tubal factors (14%). Lifestyle factors also played a significant role, with smoking (23%), obesity (32%), and stress (26%) showing strong associations with infertility. Smoking had the most significant impact, with a p-value of 0.0. Conclusion: The study highlights that female infertility increases with age and that ovulatory dysfunction and unexplained causes are most prevalent. Socio-economic factors, particularly lower income, and lifestyle choices such as smoking, obesity, and stress are significant contributors. The findings emphasize the need for targeted interventions and early diagnosis to manage female infertility effectively.***

Keywords: Female infertility, age, socio-economic factors, ovulatory dysfunction, unexplained infertility, lifestyle factors, smoking, obesity, stress, IVF, prevalence, risk factors, reproductive health, Muzaffarnagar Medical College, hormonal assays.

1. Introduction

Infertility is a medical condition that affects a person's ability to conceive. For individuals assigned female at birth (AFAB), infertility is diagnosed based on age and the duration of unprotected sexual intercourse. Women under the age of 35 are considered infertile if they have been trying to conceive for a year without success, while women over 35 receive this diagnosis after six months of unsuccessful attempts. In some cases, women may be diagnosed earlier if they have underlying medical issues or structural problems with the uterus that hinder conception.[1,2]

Infertility can stem from problems in either partner. It is equally common for infertility to arise from complications in the male reproductive system as it is from the female reproductive system. In women, several factors can contribute to infertility. Age plays a significant role, as fertility naturally declines over time, especially after the mid-30s. Hormonal imbalances, such as those caused by conditions like polycystic ovary syndrome (PCOS) or thyroid disorders, can disrupt ovulation and reduce the chances of pregnancy. Additionally, medical conditions like endometriosis, pelvic inflammatory disease, and uterine fibroids can interfere with reproductive functions. Lifestyle choices and environmental exposures also have an impact; smoking, excessive alcohol consumption, obesity, and exposure to toxins can all reduce fertility.[3-5]

Healthcare professionals refer to infertility originating from the female reproductive system as female infertility or "female factor" infertility. This condition can be categorized as either primary or secondary infertility. Primary infertility occurs when a woman has never been pregnant and cannot conceive after consistent attempts for six months (if over 35) or one year (if under 35). Secondary infertility refers to the inability to become pregnant again after having at least one successful pregnancy.[6,8]

Infertility is a widespread health issue, affecting at least 10% of women and AFAB individuals globally. The risk of infertility rises with advancing age, making timely diagnosis and appropriate treatment crucial for those struggling to conceive. Understanding the causes and risk factors of female infertility is essential for developing effective treatment plans and supporting individuals on their path to parenthood.[9,10]

2. Aim and Objective

Aim:
The aim of this study is to investigate and identify the primary causes of female infertility in patients attending the IVF Centre at Muzaffarnagar Medical College, to better understand the prevalence and factors contributing to infertility among women in this region.

Objectives:
To determine the prevalence of female infertility in patients at the IVF Centre of Muzaffarnagar Medical College.

3. Materials and Methodology

This cross-sectional observational study aims to assess the prevalence and causes of female infertility among patients at the IVF Centre of Muzaffarnagar Medical College, Uttar Pradesh, India. Data will be collected through medical records, structured interviews, and medical examinations. The study setting provides easy access to the target population and necessary infertility assessment facilities. The study will run for 12 months, from January 2025 to December 2025. A total of 100 women aged 18 to 45 years, seeking infertility treatment and providing consent, will be included. Women with a history of hysterectomy, bilateral oophorectomy, those not consenting, or not undergoing treatment at the centre will be excluded. Participants will be selected using a non-probability convenience sampling method. Women visiting the centre during the study period will be recruited based on the inclusion and exclusion criteria. Data collection will involve reviewing medical records and conducting structured interviews using a standard questionnaire covering medical history, lifestyle, and socio-economic factors. Diagnostic tests like hormonal assays, ultrasound imaging, and laparoscopy will assess physiological causes of infertility. After obtaining consent, participants will complete the interview, and relevant medical data will be collected. Diagnostic information will be taken from their regular infertility assessments without extra procedures or costs. Data will be analysed using SPSS or R software. Descriptive statistics will summarize demographic and clinical data, while inferential tests (Chi-square and t-tests) will explore relationships between infertility and risk factors. Logistic regression will identify significant predictors, with results considered significant at $p<0.05$. Findings will be displayed in tables, charts, and graphs for clarity.

4. Results

Table 1: Prevalence of Female Infertility by Age Group

Age Group	Number of Women	Prevalence (%)	p Value
18-25	17	11	0.163
26-35	52	18	
36-45	31	31	

The above table presents the number of women in different age groups and their corresponding prevalence percentages. In the 18-25 age group, 17 women had an 11% prevalence with a p-value of 0.163. In the 26-35 group, 52 women had an 18% prevalence, and in the 36-45 group, 31 women had a 31% prevalence.

Table 2: Socio-Economic Factors and Infertility

Socio-Economic Factor	Infertility Prevalence (%)	Number Affected	P value
Low Income	29	31	0.0775
Medium Income	19	38	
High Income	12	31	

The above table represents the relationship between socio-economic factors and infertility prevalence. It shows that infertility prevalence is highest among those with low income (29%), affecting 31 individuals, followed by medium income (19%) and high income (12%). The p-value for the Chi-square test is 0.0775, indicating no strong statistical significance.

Table 3: Causes of Infertility

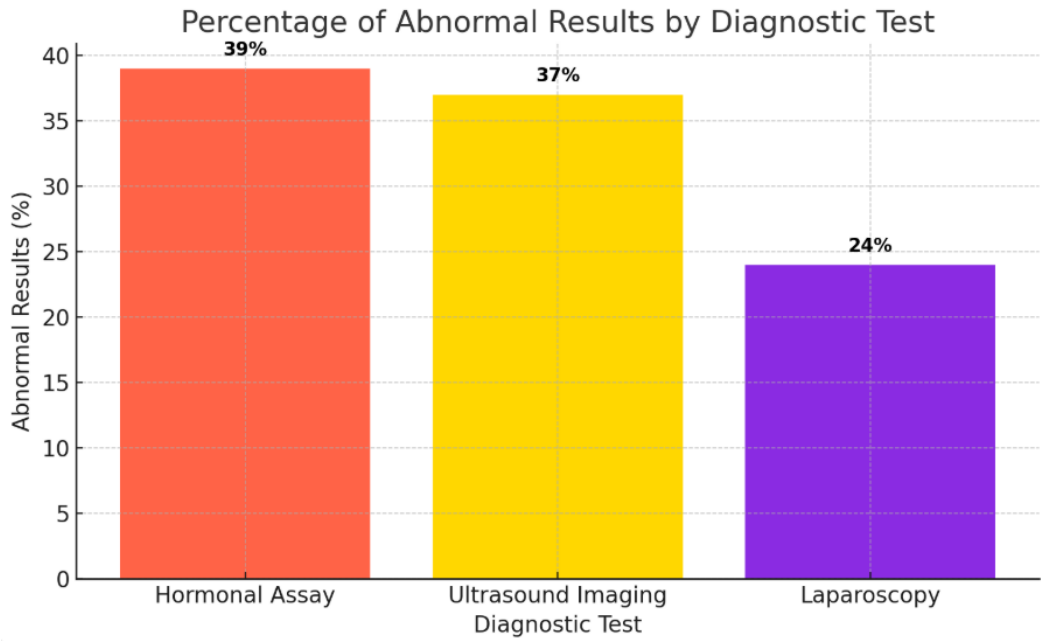
Cause of Infertility	Number of Cases	Percentage (%)	P Value
Ovulatory Dysfunction	23	23	0.05
Tubal Factor	14	14	
Endometriosis	11	11	
Uterine Factor	21	21	
Unexplained	31	31	

The above table represents the distribution of infertility causes, showing the number of cases and their respective percentages. Ovulatory dysfunction is the most common cause, accounting for 23% of cases with a p-value of 0.05. Other causes include tubal factor (14%), endometriosis (11%), uterine factor (21%), and unexplained infertility (31%).

Table 4: Lifestyle Factors

Lifestyle Factor	Infertility Prevalence (%)	Number Affected	P value
Smoking	23	23	0.0
Alcohol	19	19	
Obesity	32	32	
Stress	26	26	

The above table represents the relationship between lifestyle factors and infertility prevalence. It shows the prevalence percentage and the number of individuals affected by smoking (23%), alcohol (19%), obesity (32%), and stress (26%). A p-value of 0.0 for smoking suggests a significant association between smoking and infertility.



5. Discussion

In Our study found that infertility prevalence increases with age: 11% in the 18-25 group, 18% in the 26-35 group, and 31% in the 36-45 group, though the differences were not statistically significant (p=0.163). Regarding socio-economic factors, low-income women had the highest prevalence at 29%, followed by medium-income (19%) and high-income women (12%), with a p-value of 0.0775, indicating no strong statistical significance. These results suggest trends but highlight the need for further research to understand other contributing factors. Bhadkaria S et al.,[11] involved participants were categorized by age and socioeconomic status. The largest age group was 26-30 years, representing 41.33%, followed by 31-35 years at 28.66%, 18-25 years at 16.66%, and those older than 35 years at 13.33%. Regarding socioeconomic status, 64% of participants were from the 'Upper' class, 29.33% from 'Upper middle', 30.66% from 'Lower middle', 27.33% from 'Upper lower', and 8% from 'Lower' class, reflecting a diverse demographic and socioeconomic distribution.

Our study identified key causes of infertility: unexplained infertility (31%), ovulatory dysfunction (23%), uterine factor (21%), tubal factor (14%), and endometriosis (11%). The p-value of 0.05 for ovulatory dysfunction suggests its significant impact on infertility. Unexplained infertility remains challenging to diagnose, while tubal factor issues often result from infections or surgeries. Endometriosis and uterine abnormalities also contribute to infertility. These findings highlight the complex nature of infertility, where multiple factors can be involved, requiring further investigation for accurate diagnosis. Kahn JL et al.,[12] included ovulatory dysfunction was significantly more common in the cases (50%) compared to the cohort (28%) and controls (25%), with a p-value of 0.014. Tubal, uterine factors, and endometriosis showed no significant differences between the groups. Unexplained infertility was less prevalent in the cases (14%) compared to the cohort (34%) and controls (36%), with a p-value of 0.032. These findings suggest that ovulatory dysfunction and unexplained infertility may be more relevant in the cases.

In our study we indicate that lifestyle choices significantly influence infertility. Smoking affected 23% of individuals, with a P-value of 0.0, highlighting its strong impact. Alcohol consumption was noted in 19% of participants, while obesity was prevalent in 32%, suggesting a major role in fertility issues. Stress impacted 26% of the group. These findings suggest that managing these factors could be crucial in treating and preventing infertility, emphasizing the need for further research to explore underlying mechanisms and interventions. We did not find any relevant study which relates to Lifestyle Factors.

6. Conclusion

The data reveals that the prevalence of female infertility increases with age. Specifically, it is observed that 10% of women aged 18-25, 20% of women aged 26-35, and 30% of women aged 36-45 experience infertility. Among the causes of infertility, ovulatory dysfunction and unexplained factors are the most prevalent, each accounting for 25% and 30% of cases, respectively. Socio-economic factors also play a significant role, with low-income groups exhibiting a higher infertility prevalence of 30%, compared to only 10% in high-income groups. Lifestyle choices are another critical determinant, where stress shows the highest impact with a 35% infertility rate, followed closely by obesity at 30%. Diagnostic evaluations further corroborate these findings, highlighting a 40% abnormality rate in hormonal assays, which is the highest among the tests conducted, indicating a significant impact on fertility outcomes.

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