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Original Article

Frequency of Common Infertility Causes in Patients Attending Infertility Clinic at Civil Hospital Karachi

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ABSTRACT

Objective: To determine the frequency of causes of infertility in infertile couples attending the infertility clinic of Ruth K.M. Pfau Civil Hospital Karachi.

Methodology: This descriptive cross-sectional study was conducted at the Infertility Clinic of Ruth K.M. Pfau Civil Hospital, Karachi, from January 2024 to June 2024. A total of 323 infertile couples were included, with female partners aged 22–40 years, male partners aged 25–55 years, and a marital duration of > 1 year. The study focused on key infertility causes, including male factors, ovulatory disorders, fallopian tube disorders, and endometriosis. Data collection involved detailed clinical histories, while diagnostic evaluations included semen analysis and ultrasound assessments. Statistical analysis was performed using SPSS version 26.0.

Results: The study included 323 couples, with mean ages of 33.24±5.071 years for husbands and 27.25±4.355 years for wives. Most of the couples (83.3%) had been married for 1–6 years, with 57.6% experiencing primary infertility and 42.4% secondary infertility. Ovulatory disorders were the most common female factor (49.8% in women aged 22–30 years and 56.3% aged >30 years, O.R. 0.772, p=0.411). Fallopian tube disorders (14.2% vs. 29.2%) and endometriosis (16.4% vs. 6.3%) showed significant age-related differences (O.R. 0.401, p=0.010) & (O.R. 2.935, p=0.047). Male factor infertility affected 17.3% of men aged 25–35 years and 14.3% aged >35 years (O.R. 1.256, p=0.564).

Conclusion: The findings of this study indicated that primary infertility was the most prevalent type, and ovulatory disorders was the most common female factor, followed by fallopian tube disorders and endometriosis, both of which had a significant association with age. Male factor infertility was less common, and age did not contribute significantly. This highlights the need for thorough assessments of both partners to guide focused and effective infertility treatment.

Keywords: Endometriosis, Fallopian tube disorders, Infertility, Male factor, Ovulatory disorders

INTRODUCTION

Infertility is a worldwide public health problem defined as pregnancy without birth after 1 year of regular and unprotected intercourse. Around 10–15% of couples face it globally, with wide variation between regions[1]. The prevalence of infertility varies between 6.9% and 18.9% in developing countries depending on cultural, environmental, and socio-economic reasons[2]. Infertility is classified into primary and secondary; couples who have not been pregnant are said to have primary infertility, whereas secondary infertility is impaired conception after the first successful pregnancy[3].

Adverse effects of infertility go beyond medical issues to fundamental social and psychological matters. Infertility is thus a distressing and upsetting problem for people and couples affected by it as their ability to have children is often linked to social identity, marital stability and personal fulfillment in many societies[4].

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Infertility is multi-factorial and can be due to female, male or both factors. Around 50-55% of female infertility is related to ovulatory disorders, and 20-35% is related to tubal factors[5]. Other important etiologies are endometriosis, abnormalities of the uterus and polycystic ovary syndrome (PCOS)[6]. Male infertility, diagnosed in 20–40% of all infertile couples[6], may be due to poor sperm quality[7], hormonal[8], and lifestyle factors, including, but not limited to smoking or drug use[7].

When it comes to fertility, lifestyle factors are key. Reproductive health of both sexes is adversely influenced by deleterious factors including smoking, being overweight and/or obese, excessive use of alcohol and exposure to environmental toxicants e.g. pesticides, heavy metals[8]. The next important factor is the advanced maternal age; after 35 years, female fertility decreases significantly due to diminished ovarian reserve and oocyte quality[9]. Likewise, in men, aging leads to reduced sperm motility and sperm with higher genetic aberrations[10].

Around 10-15% of couples have an unexplained fertility factor despite extensive testing. This emphasizes the intricacy of reproductive biology and its requirement for sophisticated diagnostic methods[11]. Infertility is not just a health issue but a social problem, especially in cultures where bearing children is part of the structure of social roles[1]. The stigma of infertility, especially in developing countries, is more heavily placed on women[12]. Infertile women in some societies, however, incur harsh punishment such as social ostracization, marital discord, and/or physical violence[13]. This stigma comes down to couples as well, adding stresses to relationships and combining emotional and psychological impact[14].

Infertility incurs heavy psychological burdens, including anxiety, depression, self-blame, and social isolation. Women experience greater psychological distress according to other studies, owing partially to psychological pressure and

perception of infertility as a personal failure[15,16].

The diagnosis and treatment of infertility has been revolutionized by modern diagnostic tools and therapeutic interventions. The gold-standard techniques for the evaluation of uterine and tubal factors are diagnostic laparoscopy and hysteropasalpingography[16]. In both partners, hormonal evaluations, semen analysis and imaging modalities are used regularly to detect the underlying causes[17].

Options range from lifestyle changes and medications to assisted reproductive technology. Infertility diagnosis and treatment is one of the most synergic visions obtained from the fusion of basic and clinical research, with breakthroughs such as in-vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) bringing new hope to many couples (> 70 million ART cycles expected to be performed around the world by 2040[18]. Yet, access is impeded by the high costs and scarcity of these technologies in resource-limited contexts[19].

There have been great advances but gaps in knowledge and care remain. Educational background & cultural beliefs usually delay the timely treatment. Many couples seek traditional healing or non-medical solutions before they consult a healthcare practitioner which makes the condition even more complex[20].

The current study was designed to assess the frequency of causes of infertility in infertile couples presenting to infertility clinic. Identifying the most common etiologic causes, the present study aims to help direct focused diagnostic and therapeutic approaches. Moreover, this information will assist in developing more targeted public health interventions that can effectively improve awareness, reduce stigma and improve access to fertility care in low-resource settings.

METHODOLOGY

This descriptive cross-sectional study was conducted, at the infertility clinic of Ruth K.M. Pfau Civil Hospital, Karachi, Pakistan, over six months, from January 2024 to June 2024. A total of 323 married couples, diagnosed with infertility were included. The sample size was calculated through the W.H.O sample size calculator on the basis of primary infertility (70%)[21], margin of error (d)=5% and confidence level (C.I)=95%. The inclusion criteria required female partners to be aged 22 to 40 years, and male partners aged 25 to 55 years, with marital duration exceeding one year. The participants were required to have complete clinical and laboratory data to ensure comprehensive analysis.

Couples were excluded if they had a history of advanced infertility treatments (e.g., in-vitro fertilization [IVF] or intracytoplasmic sperm injection [ICSI]) to focus on primary diagnostic assessments. The participants with uncontrolled chronic medical conditions (e.g. poorly managed diabetes or thyroid disorders), known genetic, or congenital infertility disorders, or untreated reproductive infections (e.g., pelvic inflammatory disease or sexually transmitted infections) were excluded due to the confounding effects of these conditions on infertility outcomes. The recent pregnancy loss, or abortion within the last six months was also an exclusion criterion to eliminate transient infertility. Participants with a history of heavy substance abuse or smoking, which are well-established risk factors for infertility, were excluded to avoid skewing the analysis. Furthermore, the participants unable to provide informed consent due to psychological or cognitive impairments were also excluded to ensure ethical participation.

The study received approval from the institutional ethical review board and a written informed consent was obtained from all the participants before inclusion. Details regarding demographic and clinical histories were collected which included age, duration of marriage, and monthly income. The data on infertility types classified as primary (no prior conception) or secondary (difficulty conceiving after a prior pregnancy) were systematically documented.

The diagnoses of infertility causes were performed using the standardized protocols. The male factor infertility was analyzed through semen analysis evaluating sperm count, motility, morphology and other seminal parameters according to World Health Organization (WHO) criteria. Analyses were conducted in the certified laboratories to ensure precision and consistency. The ovulatory disorders were diagnosed, based on clinical history, menstrual cycle assessment, and hormonal profiling, including levels of luteinizing hormone (LH), follicle-stimulating hormone (FSH), and anti-Müllerian hormone (AMH). Ultrasound findings indicative of polycystic ovary syndrome (PCOS) was evaluated according to the Rotterdam criteria.

Fallopian tube disorders were primarily diagnosed using hysterosalpingography (HSG), a gold-standard imaging technique for assessing tubal patency and structural abnormalities. In cases where additional detail was required, transvaginal ultrasound or sonohysterography was employed to detect pelvic adhesions or other anomalies. The endometriosis was identified through the combination of clinical examination, and imaging modalities including transvaginal ultrasound for ovarian endometriomas, and pelvic adhesions, laparoscopy was used as a definitive diagnostic tool in the cases, where imaging findings were inconclusive.

Participants were counseled on their diagnostic findings and guided toward therapeutic options tailored to their specific diagnoses, including assisted reproductive technologies (ART), ovulation induction, or surgical interventions.

The data collected was analyzed using the SPSS version 26.0. Descriptive statistics, including mean± standard deviation with frequencies and percentages, were calculated to summarize demographic factors and causes of infertility. The Chi-square test was applied to assess the statistical association at 5% level of significance.

RESULTS

Table I reported a detailed overview of the demographic characteristics of the study participants, which include the age of both husbands and wives, the duration of marriage, monthly income levels, and the type of infertility experienced by the participants. Regarding the husbands' age, the mean was noted as 33.24 years with a standard deviation (SD) of ±5.071. The majority of husbands (80.5%) lie within the 25–35 years age group, while a smaller proportion (19.5%) were aged above 35 years. Similarly, the wives were predominantly younger, with a mean age of 27.25±4.355 years. Among them most of them (85.1%) were in the 22–30 years age group, and only 14.9% were aged above 30 years, indicating that the study population primarily consisted of younger couples. The duration of marriage was another significant demographic characteristic of the study. The mean duration of marriage was noted as 4.76±1.723 years. Among them 83.3% couples had been married for a relatively short period between 1 and 6 years, while a smaller proportion (16.7%) reported a marriage duration > 6 years. The monthly income was distributed into three groups highlighting the socio-economic status of the study participants. A significant majority (65.6%) noted their family income was > 50,000 rupees per month highlighting a higher income demographic for the most participants,

meanwhile, 29.7% of participants had an income ranging from 20,000 to 50,000 rupees, and small minority (4.6%) earned less than 20,000 rupees monthly reflecting a diverse economic distribution within the study sample.

Finally, the study also stated the type of infertility experienced by the participants. Primary infertility was the most commonly reported type affecting 57.6% of patients while remaining 42.4% reported experiencing secondary infertility. This distribution shows a slight predominance of primary infertility among the study population.

Table II compares infertility causes across various age groups, for both husbands & wives, stated the rate of male factor infertility, as well as ovulatory disorders, fallopian tube disorders, and endometriosis. Among husbands, male factor infertility was observed in 17.3% of men aged between 25–35 years and 14.3% of those aged over 35 years, with an odds ratio (O.R.) of 1.256 (95% confidence interval [C.I.]: 0.578–2.727) and a p-value of 0.564, indicating statistically insignificant difference between the age groups. Ovulatory disorders were noted as the most common cause of infertility, affecting 49.8% of women between age group 22–30 years and 56.3% > 30 years of age, with an O.R. of 0.772 (95% C.I.: 0.416–1.432) and a p-value of 0.411, showing insignificant association with age. Fallopian tube disorders were reported in 14.2% of women in the younger age group and 29.2% in the older age group, yielding an O.R. of 0.401 (95% C.I.: 0.198–0.815) and a p-value of 0.010, similarly showing age related significance. Endometriosis was noted in 16.4% of women aged 22–30 years and 6.3% > 30, indicating the statistically significant difference with (O.R: 2.935; 95% C.I.: 0.874–9.857 & p = 0.047).

Table I: Demographic Characteristics of Study Participants (n=323)

Variable	**n (%)**
Husband's Age (Mean ± SD) = 33.24 ± 5.071	
25-35 years	260 (80.5)
>35 years	63 (19.5)
Wife's Age (Mean ± SD) = 27.25 ± 4.355	
22-30 years	275 (85.1)
>30 years	48 (14.9)
Duration of Marriage (Mean ± SD) = 4.76 ± 1.723	
1-6 years	269 (83.3)
>6 years	54 (16.7)
Monthly Income	
< 20,000 rupees	15 (4.6)
20,000-50,000 rupees	96 (29.7)
>50,000 rupees	212 (65.6)
Types of Infertility	
Primary	186 (57.6)
Secondary	137 (42.4)

Table II: Comparison of Infertility Causes with Age Groups

Infertility Causes	**Husband's Age Group**			**P-Value**
	25—35	**>35**	**O.R 95% C. I**	
Male Factor, *n* (%)	45 (17.3)	9 (14.3)	1.256 (0.578----2.727)	0.564
	Wife's Age Group			
	22—30	**>30**	**O.R 95% C. I**	**P-Value**
Ovulatory Disorders, *n* (%)	137 (49.8)	27 (56.3)	0.772 (0.416----1.432)	0.411
Fallopian Tube Disorders, *n* (%)	39 (14.2)	14 (29.2)	0.401 (0.198----0.815)	0.010
Endometriosis, *n* (%)	45 (16.4)	3 (6.3)	2.935 (0.874----9.857)	0.047

DISCUSSION

In infertility clinics, the most common causes of infertility can be broadly categorized into male and female factors. Female factors often include ovulatory disorders, fallopian tube blockages, and endometriosis, with ovulatory dysfunction being a primary cause, particularly in women of advanced age. These factors contribute significantly to primary infertility, which is more commonly observed than secondary infertility. Male infertility, often attributed to sperm abnormalities such as low count or motility, accounts for a substantial proportion of cases as well. Lifestyle factors, hormonal imbalances, and structural abnormalities can exacerbate male infertility. Both partners contribute to infertility, and it is essential for clinicians to evaluate both male and female factors to ensure comprehensive diagnosis and management. Early diagnosis and targeted treatments, such as hormonal therapies, surgical interventions, or assisted reproductive technologies, can significantly improve outcomes. Addressing these common causes in infertility clinics will guide clinicians in offering personalized, effective fertility treatments.

In the current study, we found that 57.6% of the couples had primary infertility, whereas 42.4% of the couples had secondary infertility. A similar study by Masoumi et al. in Iran, also found that primary infertility (70%) was more frequent among couples than secondary infertility (30%)[21]. In the prospective cohort study by Zhu et al. in Shanghai, China, the overall incidence of primary infertility was 19% and secondary infertility was 4%[22]. Similarly, in an Indian study, the prevalence of primary infertility was greater than secondary infertility among married couples (58% vs 42%)[4]. However, studies conducted in Central Africa and Saudi Arabia reported the prevalences of secondary infertility higher than primary infertility, 13.2% and 80.2%, respectively[5,9]. This variation in the trend of type of infertility might be due to differences in measuring techniques of primary and secondary infertility rates.

In the current study, the female factor is a more frequent cause of infertility, whereas 16% of the patients had a male factor. In an Irani study conducted by Kazemijaliseh et al., ovulatory dysfunction (40%) and male factors (29%) were the commonest causes of infertility[22].

Additional analysis of our study showed that fallopian tube disorders and endometriosis were significantly associated with the age of females. Whereas ovulatory disorders were the common cause of primary infertility, which could be because of higher marital ages of females and propensities of delayed conception among couples[11]. A local study by Haider F, et al stated that primary infertility was prevalent in 55% of patients and 45% in secondary infertility[23]. The study also reported that 51% patients were diagnosed with ovulatory disorders, endometriosis was noted in 13%, fallopian tube disorder was recorded in 21% and male factor was noted in 15% of patients[23].

Older age is also considered a potential risk factor for infertility in female partners[12-15]. In our study we found male age was not related to male factor, most of the patients with male factor were aged 25 to 35 years. Masoumi et al. found that 43% of the infertile males were of age 30 to 40 years[21]. Furthermore, various research has shown a significant reduction in sperm motility with an increase in male age[4].

Our study had some limitations. It did not examine male infertility risk factors or analyze variations in infertility causes based on educational or socioeconomic status. Additionally, this single-center study's limited sample size may restrict its generalizability. Future multi-center studies with larger samples are recommended to further explore these socio-demographic factors in infertility.

The strength of the study is in the comprehensive analysis of primary & secondary infertility highlighting gender specific causes & providing a contextual comparison with global and regional data. The findings recommend a holistic approach to infertility evaluation, ensuring both male & female factors are thoroughly evaluated, prior to initiating aggressive line of treatment. Special emphasis should be there on reproductive counseling, and the timely interventions for women with advancing age.

CONCLUSION

The findings of this study indicated that primary infertility was the most prevalent type, and ovulatory disorders was the most common female factor, followed by fallopian tube disorders and endometriosis, both of which had a significant association with age. Male factor infertility was less common, and age did not contribute significantly. This highlights the need for thorough assessments of both partners to guide focused and effective infertility treatment.

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Authors' Contributions: **Saima I:** Served as corresponding author coordinated the overall research process and collected the data. **Sikandar A:** Developed the literature review and conceptual framework, while **Sajjad A:** Was responsible for data collection, drafting the manuscript, and managing references. **Tanweer Ahmed:** Supervised the study carried out data analysis, developed the methodology, interpreted results, and drafted the discussion section. **Shahzeena:** Worked on the discussion and comparison of findings with existing literature. **Abdullah S:** Worked on final drafting and bibliography. Additionally, all authors contributed to reviewing, editing, and finalizing the manuscript for submission.

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