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EPIDEMIOLOGICAL STUDY OF INFERTILITY IN COUPLES IN BAGHDAD

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ABSTRACT

Background: Infertility represents a major public health issue, affecting people of all genders and carrying significant social consequences. It is ranked as the fifth most serious disability worldwide and can deeply influence the self-esteem and psychological well-being of those affected. The aim of this study is to assess the incidence and prevalence of infertility among couples in Baghdad City, Iraq. Methods: A cross-sectional study to evaluate risk factors for infertility. The study conducted in the infertility center in Baghdad, it was carried out between 11th March, 2024, to 3rd May, 2025. The sample consisting of 500 infertile couples were diagnosis with infertility. All individuals attending the infertility center who agreed to participate in the study were included after confirming that they met the predefined eligibility criteria. Each participant was enrolled only once during the study period. A structured questionnaire was specifically developed for this study. Data were collected using a face-to-face interview method. Results: The majority of participants had primary infertility (61.6%, 308), compared to secondary infertility (38.4%, 192). There was a statistically significant association between the study groups and gender ($\chi^2 = 10.52$, $p = 0.001$) as well as education level ($\chi^2 = 9.87$, $p = 0.02$). Highly significant differences were observed in children number ($\chi^2 = 120.6$, $p < 0.001$), management modalities ($\chi^2 = 18.75$, $p < 0.001$), and treatment outcomes ($\chi^2 = 95.30$, $p < 0.001$). Women with ≥1 child were significantly more likely to have secondary infertility (OR = 19.8, 95% CI: 11.5–34.0). Additionally, miscarriage was significantly associated with secondary infertility (OR = 5.05). Female gender (OR = 1.98) and higher education level (OR = 1.65) also showed significant associations. Multivariate logistic regression analysis revealed that having one or more children was the strongest independent predictor of secondary infertility (AOR = 15.6, 95% CI: 8.9–27.3, $p < 0.001$). Miscarriage was also significantly associated with secondary infertility (AOR = 4.12, $p < 0.001$). Female gender (AOR = 1.72, $p = 0.018$) and higher education level (AOR = 1.48, $p = 0.041$) remained significant after adjustment. Conclusion: Infertility remains a major reproductive health concern, with secondary infertility more common in women and primary infertility overall. Female infertility rises with age and after childbirth, while male infertility often appears from puberty. Family history also increases risk. These findings emphasize early evaluation, targeted interventions, and personalized treatment, with further research needed to clarify gender-specific risk factors and improve management.

Keywords: Primary Infertility, Secondary Infertility, Assisted Reproductive Techniques, IVF, Ovulation Induction

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INTRODUCTION

Infertility is a widespread public health concern that significantly affects individuals of all genders and society as a whole. It is classified as the fifth most severe global disability and has a profound impact on the self-esteem of affected individuals. The negative consequences of infertility are disproportionately greater for women, creating a substantial societal burden (1).

According to the World Health Organization (WHO), infertility is defined as the inability of a couple to achieve pregnancy after one year of regular, unprotected sexual intercourse. Approximately 15% of couples of reproductive-age worldwide experience infertility, with the majority residing in developing countries. Male factors contribute to about 30% of infertility cases, while combined male and female factors account for approximately 40%. Female factors alone are responsible for 20–70% of infertility cases (2). The prevalence of infertility varies widely across regions. In industrialized countries, prevalence ranges from 3.5% to 16.7%, whereas in low-income countries it ranges from 6.9% to 9.3% (3).

In Iraq, infertility rates have shown a continuous increase over a 16-year period (2000–2016). This rise has been attributed to several factors, including genetic predisposition, war-related exposure, smoking, occupational hazards, psychological stress, lifestyle factors, and dietary habits. However, studies conducted in Iraq have reported no significant regional variations among Iraqi males, as such variations were addressed in only a limited number of studies (4).

Infertility is classified into two main types: primary and secondary infertility. Primary infertility refers to the inability to conceive in individuals who have never achieved a pregnancy, while secondary infertility is defined as the inability to conceive following at least one previous pregnancy (5).

Evaluation and management of infertility require assessment of both partners, as male and female factors often coexist. The male factor contributes to nearly 50% of infertility cases. Causes of male infertility may be reversible or irreversible and include age, medication use, surgical history, environmental exposures, genetic factors, and systemic diseases. The evaluation of male infertility aims to identify contributing causes, treat reversible conditions, determine suitability for assisted reproductive techniques (ART), and provide counseling regarding irreversible or untreatable conditions (6).

Women also play a significant role in infertility, with common causes including ovulatory disorders, fallopian tube abnormalities, uterine lesions, and endometriosis. Standard infertility treatments include hormonal therapy—such as follicle-stimulating hormone and human chorionic gonadotropin—tubal reconstructive surgery, and assisted reproductive technologies. However, hormonal treatments may be associated with adverse effects, including ovarian hyperstimulation syndrome (OHSS) and psychological disturbances (7).

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The aim of this study is to assess the incidence and prevalence of infertility among couples in Baghdad City, Iraq.

METHODS

Study Design

A cross-sectional study to evaluate risk factors for infertility. The study conducted in the infertility center in Baghdad, it was carried out between 11th March, 2024, to 3rd May, 2025. The sample consisting of 500 infertile couples were diagnosis with infertility.

Sampling

All individuals attending the infertility center who agreed to participate in the study were included after confirming that they met the predefined eligibility criteria. Each participant was enrolled only once during the study period.

Ethical Considerations

Prior to initiating the research procedures, administrative and ethical approval was obtained through submission of the study proposal to the Scientific and Ethical Committee of the Al-Rusafa Health Directorate. Before conducting interviews, the researchers clearly explained the purpose and objectives of the study to each couple. Verbal informed consent was obtained from all participants before data collection. Participants were assured that their participation was voluntary, their responses would remain anonymous and confidential, and the collected data would be used solely for research purposes.

Procedure

A structured questionnaire was specifically developed for this study. Data were collected using a face-to-face interview method. The questionnaire was divided into nine sections:

Socio-demographic characteristics (age, residence, body mass index, educational level, occupation of the woman and her spouse, and monthly income);

Obstetric and gynecological information;

History of infertility;

Gynecological history;

Surgical history;

History of genital tract infections;

Semen analysis findings;

Hormonal-related information;

Lifestyle factors.

A pilot study was conducted to evaluate the reliability of the questionnaire prior to the main study. The

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pilot included 10 participants selected from the study population (5 infertile women and 5 infertile men) attending the infertility center. Inter-examiner reliability testing (observer and co-observer) demonstrated satisfactory reliability, as the responses to questionnaire items were consistently similar under expert and researcher supervision.

Statistical Analysis

Descriptive statistics were used to summarize participants' sociodemographic and clinical characteristics, including frequencies and percentages for categorical variables. Comparisons between primary and secondary infertility groups were performed using the Chi-square (χ^2) test for categorical variables. Crude associations were quantified using Odds Ratios (ORs) with 95% confidence intervals (CIs). To identify independent predictors of secondary infertility, multivariate binary logistic regression was conducted, adjusting for potential confounders. Adjusted Odds Ratios (AORs) with 95% CIs and p-values were reported. Statistical significance was set at $p < 0.05$. All analyses were performed using IBM SPSS Statistics software (version 24).

RESULTS

The majority of participants had primary infertility (61.6%, 308), compared to secondary infertility (38.4%, 192). (Figure 1)

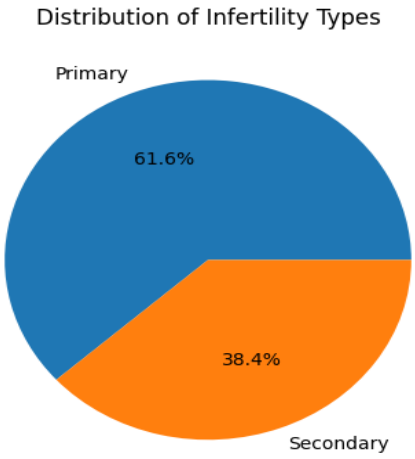

Figure 1: Distribution of study participants by infertility type.

There was a statistically significant association between the study groups and gender ($\chi^2 = 10.52$, $p = 0.001$) as well as education level ($\chi^2 = 9.87$, $p = 0.02$). Highly significant differences were observed in children number ($\chi^2 = 120.6$, $p < 0.001$), management modalities ($\chi^2 = 18.75$, $p < 0.001$), and treatment outcomes ($\chi^2 = 95.30$, $p < 0.001$). However, no statistically significant differences were found between groups regarding age, residency, job status, marriage period, and family history ($p > 0.05$). (Table 1)

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Table 1. Comparative Analysis of Sociodemographic Factors, Treatment Modalities, and Reproductive Outcomes in Primary and Secondary Infertility.

Variables		Primary (n=308)		Secondary (n=192)		p-value
		No.	%	No.	%	
Gender	Male	110	35.7	42	21.9	0.001
	Female	198	64.3	150	78.1	
Age (years)	<25	103	33.4	64	33.3	0.992
	≥25	205	66.6	128	66.7	
Residency	Urban	155	50.3	80	41.7	0.063
	Rural	153	49.7	112	58.3	
Job	Yes	112	36.4	69	35.9	0.918
	No	196	63.6	123	64.1	
Education	Illiterate	59	19.2	20	10.4	0.02
	Primary school	71	23.1	43	22.4	
	Secondary school	102	33.1	66	34.4	
	Post graduated	70	22.7	63	32.8	
Marriage Period	1 -5	211	68.5	132	68.8	0.965
	6-15	97	31.5	60	31.3	
Children number	None	186	60.4	20	10.4	0.0001
	One	34	11.0	125	65.1	
	More >1	82	26.6	47	24.5	
Family History	Yes	31	10.1	18	9.4	0.8
	No	271	89.9	174	90.6	
Management	IVF	46	14.9	53	27.6	0.0001
	Ovulation Induction	80	26.0	58	30.2	
	Surgery	52	16.9	36	18.8	
	Hormone	124	40.3	45	23.4	
Outcomes	Failed	77	25.0	12	6.3	0.0001
	Miscarriage	32	10.4	82	42.7	
	Pregnant	193	62.7	98	51.0	

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Women with ≥1 child were significantly more likely to have secondary infertility (OR = 19.8, 95% CI: 11.5–34.0). Additionally, miscarriage was significantly associated with secondary infertility (OR = 5.05). Female gender (OR = 1.98) and higher education level (OR = 1.65) also showed significant associations. (Table 2)

Table 2. Sociodemographic and Clinical Predictors of Secondary Infertility: A univariate Logistic Regression Analysis Approach

Variable	Category	OR	95% CI	Interpretation
Gender	Female vs Male	**1.98**	(1.30–3.02)	Females more likely in secondary group
Age	≥25 vs <25	**1.00**	(0.68–1.47)	No association
Residency	Rural vs Urban	**1.42**	(0.98–2.05)	Borderline
Job	No vs Yes	**1.02**	(0.70–1.5)	No association
Education	Higher vs Lower	**1.65**	(1.10–2.47)	Significant
Marriage Period	6–15 vs 1–5	**0.99**	(0.66–1.48)	No association
Children number	≥1 vs None	**19.8**	(11.5–34)	Very strong association
Family History	Yes vs No	**0.93**	(0.50–1.72)	No association

Multivariate logistic regression analysis revealed that having one or more children was the strongest independent predictor of secondary infertility (AOR = 15.6, 95% CI: 8.9–27.3, $p < 0.001$). Miscarriage was also significantly associated with secondary infertility (AOR = 4.12, $p < 0.001$). Female gender (AOR = 1.72, $p = 0.018$) and higher education level (AOR = 1.48, $p = 0.041$) remained significant after adjustment. (Table 3)

Table 3. Determinants of Primary and Secondary Infertility: A Multivariate Logistic Regression Analysis

Variable	Category	AOR	95% CI	p-value
Gender	Female vs Male	**1.72**	1.10 – 2.70	0.018
Education	Higher vs Lower	**1.48**	1.02 – 2.20	0.041
Children number	≥1 vs None	**15.60**	8.90 – 27.30	<0.001

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DISCUSSION

The majority of participants had primary infertility (61.6%), while secondary infertility accounted for 38.4%. Multivariate analysis demonstrated that having one or more children was the strongest independent predictor of secondary infertility (AOR = 15.6, 95% CI: 8.9–27.3, $p < 0.001$), consistent with the clinical definition of secondary infertility. Miscarriage history was also significantly associated with secondary infertility (AOR = 4.12, 95% CI: 2.45–6.92, $p < 0.001$), highlighting its impact on reproductive outcomes. Female gender (AOR = 1.72, $p = 0.018$) and higher education (AOR = 1.48, $p = 0.041$) showed moderate associations, suggesting that social and behavioral factors may influence fertility patterns. These results differ from a study in Ethiopia, where the highest infertility rates were observed in the 20–30-year age group (8). In contrast, our findings align with (9), which also found that infertility was more common among younger married couples.

Secondary infertility occurred more frequently in women, while primary infertility remained the most common overall. This pattern could be due to women developing reproductive complications after their first pregnancy, whereas male infertility often becomes apparent either prior to or soon after marriage. Moreover, having a family history of infertility also seemed to contribute to the risk (10).

Treatment methods and interventions differed between men and women. These results contrast with a study from China, which found a higher prevalence of primary infertility (10). Nevertheless, our findings are consistent with other research reporting comparable infertility trends and treatment approaches (11, 12).

Infertility among women increased with age and after childbirth, indicating that hormonal and physiological changes play a major role in declining female fertility. In men, fertility problems typically emerge from puberty onward. These observations are in line with the findings of previous studies (12, 13).

In addition, the prevalence and incidence of infertility were determined for both sexes. The rate of male infertility observed in this study aligns with previously reported findings (14). Similar prevalence rates for male and female infertility have also been documented in recent studies conducted in China (15), as well as in research by Leslie et al. (16) and Liu et al. (17).

CONCLUSION

In conclusion, infertility remains a significant reproductive health concern, with secondary infertility being more common in women and primary infertility observed overall. Female infertility increases with age and after childbirth, likely due to physiological and hormonal changes, whereas male infertility often manifests earlier, from puberty onward. A positive family history also contributes to infertility risk. These findings highlight the importance of early evaluation, targeted interventions, and

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individualized treatment strategies for both men and women to improve reproductive outcomes.

LIMITATIONS

This study has several limitations. First, it was conducted in a specific geographic region, which may limit the generalizability of the findings to other populations. Second, data on infertility risk factors were primarily self-reported, which could introduce recall bias. Third, the cross-sectional design prevents establishing causal relationships between risk factors and infertility. Finally, certain potential confounding factors, such as environmental exposures and detailed hormonal assessments, were not fully evaluated, which may have influenced the results. Future studies with larger, multicenter populations and longitudinal designs are needed to address these limitations.

CLINICAL IMPLICATIONS AND FUTURE RECOMMENDATIONS

The findings of this study have important clinical implications. Early identification and evaluation of infertility, particularly among women after childbirth and in men from puberty onward, can guide timely interventions and improve reproductive outcomes. Clinicians should consider both gender-specific and family history–related risk factors when developing individualized management plans. Fertility counseling and preventive strategies, including lifestyle modifications, could help reduce the burden of infertility. For future research, multicenter longitudinal studies are recommended to better understand causal relationships and to explore environmental, hormonal, and genetic factors influencing infertility. Additionally, evaluating the effectiveness of different treatment approaches across diverse populations will help optimize clinical guidelines and improve patient care.

AUTHORS' CONTRIBUTIONS

1; Conceptualization; Data Curation; Method; Resource; Software; Writing – original draft and Writing – review & editing

2; Conceptualization; Data Curation; Investigations; Project administration; Writing – original draft and Writing – review & editing

3; Conceptualization; Data Curation; Investigations; Methods; Project administration; Resources; Writing – original draft and Writing – review & editing

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