



Prevalence and incidence of infertility among Couples in Kirkuk City

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Abstract:

Background:

Infertility rates are on the rise globally, including in Iraq, particularly in recent years. This can be attributed to reasons such as conflicts, lifestyle choices, and other influencing variables. Additionally, the industrial nature of Kirkuk, a city in Iraq, may also contribute to the increased incidence of infertility. There has been a rise in infertility cases, but there is a lack of past comprehensive studies on infertility. This study aimed to estimate prevalence and incidence of infertile among Couples in Kirkuk City

Methods:

This was a cross-sectional study conducted from January 5, 2023, to April 10, 2024, at the infertility center in Azadi Teaching Hospital. 1,100 individuals were diagnosed with infertility, consisting of 711 females and 389 males. A non-probability, purposive sample was employed in the study. Data were collected using an interview-structured questionnaire with nine parts includes Part one (Socio-Demographic Characteristics), Part two (Obstetric and Gynecological Data), Part three (history of infertility), part four (Gynecological history), part five (Surgical history), part six (Genital tract infection history), part seven (Semen analysis), part eight (question related to Hormonal), and part nine (Question related to Life style factor). To make the instruments more valid, it were represented to a panel of (10) experts in different fields. descriptive analyses were used such as Frequency, and Percentages as well as mean and standard deviation, (Mean $\pm$ SD). Odds Ratio and their 95% confidence interval (C.I.) are used to compare relative odds of occurrence outcomes of interest e.g. (Second Infertility/Primary Infertility). Data entry and analysis were performed using SPSS v 23 (. Data are reported as frequency and percentage and the chi-square test was used for categorical variables. The significance level for statistical analysis was set at $p < 0.05$.

Results: the result shows 53.3% of infertility were secondary infertility, while the proportion of primary infertility in males was 78.9%. The prevalence rate of primary infertility were 0.5809% from the study sample while the prevalence rate of the second type of infertility were 0.4191. The incidence rate of infertility in females in the sampling population were 0.6464. The incidence rate of male infertility were 0.3536 from the study sample while the females infertile incidence rate in the sampling population were 0.6464 from the study sample

Conclusion: the study concluded the prevalence of primary infertility were more than secondary infertility also the study concluded the incidence rate of infertility more than in females than males. The majority of these individuals possess a high level of education, while their income level tends to be ordinary.

Key words: Prevalence, incidence, infertility, Couples, Kirkuk City

Introduction:

Infertility is a widespread public health concern that significantly affects individuals of all genders and society as a whole. Infertility is classified as the fifth most severe worldwide handicap, significantly affecting the self-esteem of individuals concerned. The adverse consequences persist as a greater societal burden for women compared to men(1).

Infertility, as defined by the World Health Organisation, is the inability of a couple after one year to achieve pregnancy-consistent unprotected sexual intercourse. Approximately 15% of couples of reproductive age around the world experience infertility, with a majority of them residing in developing nations. Male factors contribute to about 30% of infertility cases, while both male and female factors are responsible for around 40% of cases. Female factors alone account for approximately 20-70% of cases(2).

There is a wide variety of prevalence of infertility in industrialized nations, ranging from 3.5% to 16.7%, whereas, in impoverished countries, the prevalence goes from 6.9% to 9.3%(3). (Salman, Khalaf, & Hussain)

Infertility rates in Iraq have experienced a continuous increase over 16 years (2000-2016). This rise has been attributed to various factors such as genetics, war, smoking, occupation, psychological stress, lifestyle, and diet. However, studies conducted in Iraq have not found any significant regional variations among Iraqi males, as they were only mentioned in a small percentage of the studies(4).

Infertility is categorized into two distinct types: primary infertility and secondary infertility. Primary infertility is the condition of never having had a pregnancy, while secondary infertility is the inability to conceive again after having at least one previous pregnancy(5).

Both spouses must be tested and treated for infertility since male and female reasons frequently coexist. The male component accounts for 50% of infertility cases. There are reversible and irreversible causes of male fertility. Age, drugs, surgical history, environmental pollutants, genetics, and systemic disorders may affect each partner. Evaluate a guy for infertility to identify contributory causes, treat reversible ones, evaluate whether he is a candidate for ART, and advise him on irreversible and untreatable issues(6).

Moreover, women have substantial involvement in infertility. Typical causes of female infertility

frequently involve problems with ovulation, anomalies in the fallopian tubes, lesions in the uterus, and endometriosis. Common methods for addressing infertility involve the administration of sex hormones, such as follicle-stimulating hormone and human chorionic gonadotropin, as well as tubal plastic surgery and assisted reproductive technology. However, these medications consistently lead to adverse effects and severe reactions. Hormone treatment carries the risk of potentially causing the occurrence of ovarian hyperstimulation syndrome (OHSS) or mental disturbance(7).

In Iraq, infertility has various effects on sexuality, self-image, and self-esteem for men (as many of them regard fathering a child as a confirmation to their masculinity) same for women (number of them regard child bearing as an expression of their biological identity as a female), therefore the wide spread in the number of in vitro fertilization (IVF) centers and infertility clinics, might reflect a high prevalence of infertility in Iraq. Few publications was tackling infertility in Iraq therefore this study was carried out to assess incidence and prevalence of infertility at Kirkuk city.

Methodology:

Materials & Methods:

Design of the Study:

The present study employed a cross-sectional study design to evaluate risk factors for infertility in couples at Kirkuk city.

Setting & duration of the study:

The infertility Center in the city of Kirkuk, Iraq, was the setting for conducting the study. Infertility center in Azadi teaching hospital which is located at center of Kirkuk governorate and it is only center for infertility in Kirkuk city. the study was carried out between January 5, 2023, to April 10, 2024. Anon probability (purposive) sample consist of 1100 infertile couples were diagnosis from infertility who attending Azadi teaching hospital infertility center.

Tools of the study:

Through extensive review of relevant literature, a questionnaire was constructed for the purpose of the study. The data were collected using an interviewing approach the questionnaire consisted of two parts (Appendices) the questionnaire consisted of nine parts (Appendices). Part one focus on Socio- Demographic charactesic such as (age, residence, height, weight, BMI, educational

attainment of women and her spouse, occupation of the women and her spouse, monthly income), Part two (Obstetric and Gynecological Data), Part three (history of infertility), part four(Gynecological history), part five (Surgical history), part six(Genital tract infection history), part seven(Semen analysis), part eight(question related to Hormonal), and part nine(Question related to Life style factor). A pilot study was carried out to assess the questionnaire's reliability before the study's implementation on (10) individuals were selected among studied (5 infertile females, and by 5 infertile males) from Azadi teaching hospital attendants for the infertility center . Inter examiners test (Observer & co-observer) has recorded completely adequate of reliability in the pilot study, since the answers of the respondents with reference to objectives questionnaire's items, under the supervision of the expert and under the supervision of the researcher, are completely similar. Reliability Coefficient for the pilot study were calculated using Al-Naqeeb Formula The result was 0.95. To make the instruments more valid, it were represented to a panel of (10) experts in different fields. After obtaining official approval from the Kirkuk Directorate of health the researcher getting inform consent from the infertility member to participate in the present study

Sampling & sample:

The total population of infertility at Kirkuk Center consisted of only 1200 couples ,60 respondents don't willing to participate in our study ,10 of them at pilot study , non-probability sampling method (a purposive sample) were used to choose sample of the study . All the infertility people in the center agreed to participate in the study and were only included once it was ensured that they met the eligibility criteria.

Administrative and ethical consideration

Before starting the research procedures, a proposal was submitted to the Scientific and Ethical Committee of the College of Nursing at the University of Mosul/Iraq to discuss the research title and steps, after which official approval was obtained for the research title. In addition, ethical approval to conduct the study was obtained from the Collective Committee for Medical Research Ethics at the University of Mosul .Official permission was also obtained from the Ethical Research Committee in the Kirkuk Health Directorate to implement the study at Kirkuk city. Before conducting interviews with any of the couple, the researchers explained the study's objectives to them. Verbal consent was gained from each study sample before any data were gathered. Women were assured that the study was anonymous ,voluntary, and confidential and the data was for research purposes.

Statistical Analysis:

By using statistical package for social science (SPSS) version 23 The data were analyze . descriptive statistics (Frequencies, and Percentages), as well as mean and standard deviation, global mean of score GMS concerning, Redistribution of GMS by a cutoff point (e.g. The Median value) with taking in into consideration the classification according to gender .Odds Ratio and their 95% confidence interval (C.I.) are used to compare relative odds of occurrence outcomes of interest {e.g. (Second Infertility/Primary Infertility) .While Inferential data analysis including (Contingency Coefficients (C.C.) test : Estimating of the association table for finding cause's correlation ships, Chi-Square test , Binomial test also for the abbreviations of the comparison significant (C.S.), we used the followings: NS : Non significant at $P>0.05$, S : Significant at $P<0.05$ and HS : Highly significant at $P<0.01(8)$.

Result

Table (1): Distribution of the studied patients undergoing infertile status according to (SDCv.) with comparisons significant (N=1100)

SDCv.	Gender	Female		Male		Total		C.S. (*) P-value
	Classes	No.	%	No.	%	No.	%	
Age Groups	15 _ 25	308	43.3	168	43.2	476	43.3	CC = 0.032 P=0.561 (NS)
	26 _ 35	304	42.8	158	40.6	462	42.0	
	> 35 yrs.	99	13.9	63	16.2	162	14.7	
	Total	711	100	389	100	1100	100	
Residency	Urban	484	68.1	233	59.9	717	65.2	CC = 0.082 P=0.007 (HS)
	Rural	227	31.9	156	40.1	383	34.8	
	Total	711	100	389	100	1100	100	

Occupation	Housewife/Unemployed	360	50.6	147	37.8	507	46.1	CC = 0.554 P=0.000 (HS)
	Manual work	147	20.7	101	26	248	22.5	
	Office work	190	26.7	114	29.3	304	27.6	
	Other	14	2	27	6.9	41	3.7	
	Total	711	100	389	100	1100	100	
Monthly Income	Low	180	25.3	62	15.9	242	22.0	CC = 0.170 P=0.000 (HS)
	Medium	469	66	252	64.8	721	65.5	
	High	62	8.7	75	19.3	137	12.5	
	Total	711	100	389	100	1100	100	
Education	Illiterate	112	15.8	38	9.8	150	13.6	CC = 0.084 P=0.051 (HS)
	Primary school	186	26.2	106	27.2	292	26.5	
	Secondary school	155	21.8	90	23.1	245	22.3	
	University and above	258	36.3	155	39.8	413	37.5	
	Total	711	100	389	100	1100	100	

The results shows that a highly significant differences are accounted at $P < 0.01$ among observed distribution and their an expected

outcomes with reference to all of studied patient's (SDCv.), exceptional of age groups, since no significant different are accounted at $P > 0.05$ in light of gender.

Table (2): Distribution (History of Infertility) for studied sampled with comparison's significant (N=1100)

History of Infertility	Gender	Female		Male		C.S. (*)
	Responses	No.	%	No.	%	
Marriage Period	1_4	215	30.2	185	47.6	CC= 0.182 P=0.000 HS
	5_8	434	61.0	164	42.2	
	9_12	62	8.7	40	10.3	
	Total	711	100	389	100	
First child born after marriage	None	332	46.7	307	78.9	CC= 0.303 P=0.000 HS
	1_2	324	45.6	78	20.1	
	≥ 3	55	7.7	4	1	
	Total	711	100	389	100	
Do you have a child ?	No	332	46.7	307	78.9	CC= 0.298 P=0.000 HS
	Yes	379	53.3	82	21.1	
	Total	711	100	389	100	
Number of Children	None	332	46.7	307	78.9	CC= 0.304 P=0.000 HS
	One	344	48.4	67	17.2	
	Two	33	4.6	15	3.9	
	Three	2	0.3	0	0	
	Total	711	100	389	100	
Family History of Infertility	Yes	320	45	201	51.7	CC= 0.064 P=0.034 S
	No	391	55	188	48.3	
	Total	711	100	389	100	
Type of Infertility	Primary Infertility	332	46.7	307	78.9	CC= 0.298 P=0.000 HS
	Second Infertility	379	53.3	82	21.1	
	Total	711	100	389	100	
Duration of Infertility	< 1	112	15.8	5	1.3	CC= 0.243 P=0.000 HS
	1_2	295	41.5	150	38.6	
	3_4	233	32.8	164	42.2	
	≥ 5 yrs.	71	10	70	18	
	Total	711	100	389	100	
Duration care	1_2	428	60.2	207	53.2	CC= 0.069

	3 4	243	34.2	153	39.3	P=0.070 NS
	≥ 5 yrs.	40	5.6	29	7.5	
	Total	711	100	389	100	
Treatment	IVF	124	17.4	97	24.9	CC= 0.423 P=0.000 HS
	Ovulation Induction	587	82.6	0	0	
	Surgery	70	9.8	0	0.00	
	Hormone	277	39.0	292	75.1	
	Total	711	100	389	100	
Outcomes	Failed	394	55.4	239	61.4	CC= 0.103 P=0.003 HS
	Miscarriage	183	25.7	65	16.7	
	Pregnant	134	18.8	85	21.9	
	Total	711	100	389	100	

Marked in red color indicated to the Risk Factors.

The results showed highly significant differences at $P < 0.01$ between histories of infertility distributed according to both sexes, except for duration of care. Instead of stating that statistical significance was not achieved, it is more informative to report the non significant result at $P = 0.07$. For Marriage duration: 496 (69.7%) of the studied sample of female infertility cases recorded a marriage duration of 5 years or more, while 204 (52.5%) of males had a similar duration. Also the Childbirth after marriage: 332 (46.7%) of the studied sample of female infertility cases had no child born after marriage, while 307 (78.9%) of males reported the same. For Family history of infertility: 320 (45%) of the studied sample of female infertility cases had a family history of infertility, while 201 (51.7%) of males reported the same. With regard for type of infertility: 332 (46.7%) of the studied sample of

female infertility cases had primary infertility, while 307 (78.9%) of males had primary infertility. Duration of infertility: 599 (84.2%) of the studied sample of female infertility cases had a duration of infertility of >1 year, while 384 (98.7%) of males had a similar duration. Also duration of care: 283 (39.82%) of the studied sample of female infertility cases had a duration of care of >3 years, while 182 (46.8%) of males had a similar duration. For Treatment: All studied samples of female infertility cases received different types of treatments, including in vitro fertilization (IVF) (124, 17.4%), ovulation induction (587, 82.6%), surgery (70, 9.8%), and hormone therapy (277, 39.0%) for >3 years. For males, IVF (97, 24.7%) and hormone therapy (292, 75.1%) were the main treatments. Finally Outcome: 577 (81.2%) of the studied sample of female infertility cases had failed or miscarriage outcomes, while 304 (78.1%) of males reported the same for their infertile wives.

Table (3): Relationship among causes risk factors associated with infertility types and gender (N=1100)

Infertile Types	No. & %	Gender		Total	C.S. P-value
		Female	Male		
Secondary	No.	379	82	461	CC = 0.298 P = 0.000 (HS) Odds Ratio OR=4.274
	%	53.3%	21.1%	41.9%	
Primary	No.	332	307	639	
	%	46.7%	78.9%	58.1%	
Total	No.	711	389	1100	
	%	100%	100%	100%	

(*) HS: Highly Sig. at $P < 0.01$; Testing are based on a Contingency Coefficient test, which recorded P-value of the Chi-Square test.

Odds Ratio for Type of Infertility (Second Infertility/Primary Infertility); For cohort Gender : Female = 1.582; For cohort Gender : Male=0.370

Prevalence Rate of Primary Infertile type in the Sampling Population= 0.5809

Prevalence Rate of Second Infertile type in the Sampling Population = 0.4191

Females Infertile Incidence Rate in the Sampling Population = 0.6464

Males Infertile Incidence Rate in the Sampling Population = 0.3536

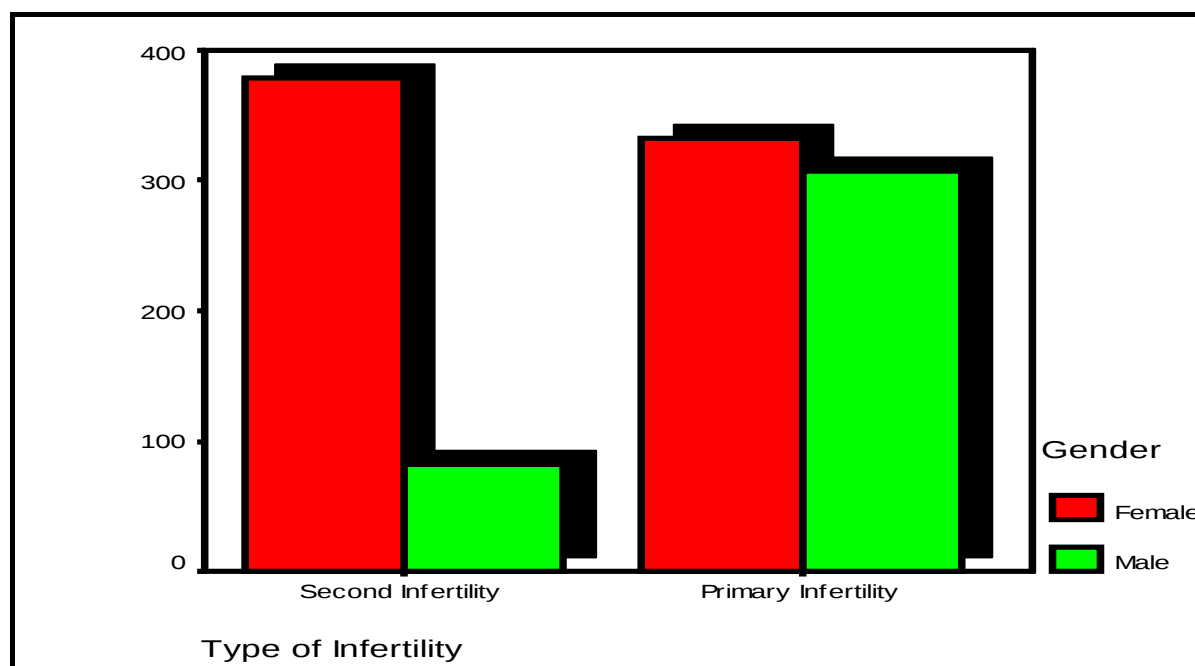


Figure (1): Cluster Bar chart for distribution of infertility types of and gender

Discussion:

According to the results of the study of demographic information in the first table for the participating couples, the age group (15-25 years) was the highest participation group, as a society tends toward early marriage, and most of them live within the city center, since the center is far from the outskirts of the city, where it is difficult for women to reach the center, and what was the percentage of men? The number of unemployed people is higher, and women are housewives, with an average income and higher education, from the point of view that most married couples are graduates, but there are no job opportunities for them to turn to other jobs, and there is a study in Ethiopia that contradicts this opinion, as the highest rate of infertility is in the age group (3-20 years)(9). There is another study that supports our study in Pakistan(Daud, Khadija, & Jabeen, 2022) In the second table, the duration of marriage was 1-12 years among the participants, and most of the married couples suffered from infertility for years, up to 10 years. Second infertility among females was the highest compared to males, while the first infertility was the highest. The point of view is that females appear fertility problems after giving birth to the first child, unlike In men, fertility problems appear before or after marriage, and there is also an effect of family history on fertility(10)

The techniques and medications used to treat infertility differed, as most men deliberately treat them with hormones, while most women rely on treating ovulation disorders, while there is a study in China that does not agree with our study, where

the first infertility is the highest, and in another study in Iran, and there is a study in London that was conducted on infertility and its treatment. It agreed with our study)(11) (Dong et al., 2021) and there is a study in London that was conducted on infertility and its treatment. It agreed with our study.

In the third table, it is clear that the relationship between the type of infertility and gender is very strong from the point of view that females lose fertility after aging and after giving birth to a child, problems appear in the female, while in males, fertility problems become clear from puberty. There are a number of studies that agree with our study, such as Marrakesh(12) .

There is also a study in Africa that also agrees with our study(Abebe, Afework, Abaynew, & Practice, 2020) (13).Prevalence and incidence rates were computed for both genders. We determine the frequency of infertility in males(14). (Liu et al., 2020) The prevalence of infertility in women aligns with a study conducted in Ethiopia (Legese et al., 2023). The prevalence of female and male infertility aligns with a recent study conducted in China (Zhu et al., 2022)(15). (Leslie et al., 2024). (Liu et al., 2020)

Conclusion:

In Iraq, especially Kirkuk, infertility cases are increasing, with women making up the largest percentage. Most women suffer from secondary infertility, while men suffer from primary infertility. There are no tests available for unexplained infertility or sperm abnormalities Not

all medications and pregnancy techniques are available in the center, and since most of the participants are middle-income, couples' suffering from infertility increases.

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