Original Research Article

An Epidemiologic Survey on the Causes of Infertility, Prevalence of Obesity, and Mental Status of Infertile Females Attending the Infertility Center in Azadi Teaching Hospital in Kirkuk City, Iraq

Abstract :

Introduction: worldwide; Infertility is a very challenging condition which brings about significant stressful that effects many individuals and couples. Obesity has become awidespread global issue and has reached epidemic extents with a negative impact on individual's body system including the reproductive system. Infertility can have profound impacts on the emotional well-being and overall quality of life of those affected, often leading to feelings of disappointment and even clinical depression.

Objective: this study aims to determine the frequency of causes of infertility among infertile women attending the infertility center in Azadi Teaching Hospital in Kirkuk City, Iraq, as well as, the relation of the duration of infertility to it. Furthermore, to find the prevalence of obesity among those women, assess the rate of depression and anxiety and investigate factors related to them.

Subjects &Methods: In this cross-sectional study, one hundred infertile females participated. Information was obtained from all the patients from medical and laboratory findings. A questionnaire about demographic data was designed for all the patients. The psychological status of patients was evaluated by administering the Hospital Anxiety Depression Scale (HADS) test.

Results: The most leading cause of infertility was Poly cystic Ovarian Syndrome(PCOS).There were statistically significant differences among the groups of the study regarding the period of infertility the nature of the disorder, 26.1%of PCOS patients experienced 2-3-year infertility. While 50% of patients with male factors infertility expressed +15-year infertility, 30.9% of patients with mixed male and female factors of infertility expressed 5–9-year infertility.The percentage of primary and secondary infertility was61.8 and 38.2, respectively. 76.7% of the women who participated were overweight or obese; only 22.3% being of normal weight. 60% of PCOS patients were overweight, and 53% of infertile women with ovulatory causes rather than PCOS were overweight. Just 18% of infertile females consume a healthy diet; furthermore, 80% of them express an uncontrolled weight. Regarding the anxiety HADS score, 74% of infertile women with infertility periods more than four years old expressed an anxiety score above 7 (borderline). 27.7% of infertile women over 40 years old express an abnormal anxiety HADS score. The percentage of abnormal depression on the HADS score in young infertile women was 4.3%, while it was 8.3% in infertile women over 40 yearsold.

Conclusion: PCOS is the most typical cause of infertility in this study. However, there may be other causes of infertility rather than PCOS for long periods of infertility. Among participating infertile women, obesity is prevalent. According to the study's findings, infertility has a significant influence on women in our society and can cause a variety of psychological symptoms, including depression and anxiety.

Key words:Anxiety,Depression, Infertility,Obesity PCOS

Introduction: -

Infertility is defined as failure to achieve pregnancy after a reasonable period of intercourse with no contraception. Infertility is not life threating condition. However, infertility negatively influence on the individual's personality and self-estimation of both male and female. The estimated prevalence of infertility in USA and Europe is about 3.5-15% and in other countries is about 6.9-9.3%(1).There is no study about prevalence of infertility in Iraq but the increase numbers of infertility centers in all parts in Iraq may reflect the impact of this issue(2).epidemiologic surveys have played a pivotal role in identifying the factors that contribute to infertility. In this article, we will delve into the most prevalent causes of infertility, including: -

Ovarian factors: - PCOS is one of the leading causes of female infertility and affects approximately 5-10% of women of reproductive age. PCOS account for up 90% of the cases of anovulation. This hormonal disorder disrupts the normal ovulation process, leading to irregular menstrual cycles and anovulation. The elevated levels of androgens (male hormones) produced by the ovaries prevent the release of mature eggs, hindering the chances of conception. Women with PCOS often experience other symptoms such as insulin resistance, obesity, and hirsutism. Apart from PCOS, other ovulatory causes can also contribute to infertility such as hypogonadotropic hypogonadism, diminished ovarian reserve, thyroid disorder, hyper prolactemia, luteinized unruptured follicle (LUFS), ovarian dystrophy, (2-6).

Cervical factors: - which involves, developmentalanomalies, trauma, cervical procedures like loop electrosurgical excision procedures, inadequate buffering capacity of acid vaginal pH, alteration of cervical mucus caused by hormonal imbalance, inflammatory disorders, cystic fibrosis, exogenous and immunological factors (3, 7).

Uterine factors: -The uterus plays a crucial role in the implantation and development of the embryo. Structural abnormalities of the uterus, such as uterine fibroids, polyps, or adhesions, can hamper the chances of successful implantation or cause recurrent miscarriages. Additionally, certain congenital abnormalities or anatomical variations can impact fertility. Ashermans syndrome are also involved in this category. Benign uterus fibroid is extremely common in women bellow forties old(3, 8).

Tubal factors: - In some cases, blockages or damage to the fallopian tubes can hinder the fertilization process by preventing the sperm from reaching the egg or the fertilized egg from traveling to the uterus. Pelvic inflammatory disease (PID), silent chlamydial infections,

endometriosis which account 7-14% of the cases of tubal factor infertility, previous pelvic surgeries, or congenital abnormalities can lead to tubal factor infertility. Diagnostic tests, such as hysterosalpingography (HSG) or laparoscopy, can help identify tubal factors and guide the appropriate treatment options, which may include surgery to repair or bypass the fallopian tubes. (3, 8, 9).

Male Factor: -Infertility is not a concern that solely affects women. Male factor infertility refers to issues related to sperm quality, quantity, or function. Several factors can contribute to male factor infertility, including low sperm count, poor sperm motility, abnormal morphology, or hormonal imbalances. In addition, lifestyle factors such as smoking, alcohol consumption, drug abuse, and obesity can also play a role. Male infertility account for about 20% of all cases of infertility , Semin analysis is the only test that can reliably diagnose 9 out of 10 men who have infertility problem with sensitivity of 89.69%(10).However some defect in sperm structure may not be identify by Semin analysis such as lack of DNA centriole which is crucial for embryo development(11).Spermatogenesis disorders and azoospermia are the most common cause of male infertility(12), low sperm count may due to endocrine problems, radiations, infections or testicular malformation(13). Sperm transport problems and sperms antibodies are also remarkable causes of male infertility(2).

The consequences of obesity-related infertility must also be considered. Obese women may experience decreased success rates in fertility treatments such as assisted reproductive technologies(14). However, there is hope for improving fertility outcomes through lifestyle modifications such as weight loss and regular exercise. These changes can enhance overall reproductive health in obese women seeking conception.Understanding the relationship between female obesity and infertility is paramount due to their increasing prevalence worldwide. Sedentary lifestyles, poor diet choices, disrupted hormonal balance, and specific health conditions like PCOS contribute to this complex issue(15)

Infertility is a personal psychological distress, which cause reduce self-esteem, feeling of failure, worry, fear, anxiety, loneliness, guilt or grief, sexual dysfunction, violence, depression and anxiety(16). The fertility for Iraqi women is a part of her female identity and strong column for succeeding her marriage. The most common reason for seeking a second wife is infertility. Infertile Iraqi female lives with psychological trauma.

The purpose of the study is to assess the causes for infertility and to ascertain the relationship between the cause and the duration of infertility. Assessing the prevalence of obesity and the knowledge of healthy eating among women who are infertile. Additionally, to evaluate the psychological status among participated infertile women.

Subjects and Methods: -

This prospective cross-sectional study was carried out at Azadi Teaching Hospital (Family Planning Center) in Kirkuk city Iraq. One thousand infertile female with age range 19-45 years old were participate in this study. The study caried out from period January 2021to October

2023.All the patients were unable to conceive after one year of unprotected intercourse. The diagnosis of infertility was done by specialists in the same center. The PCOS patients were diagnosed according to Rotterdam census meeting on PCOS 2003.Hystoesulphengeography, seminal fluid analysis, post coital test were done to identify the cause of infertility. Additional information was obtained from their hospital cards which involved laboratory and radiological reports, beside this a questionnaire that included demographic data, BMI, Duration of infertility, type of infertility and other useful information was designed for all the patients. Ethical permission was taken from all the participated.

The causes of infertility in this study were as following

- PCOS
- Other ovulatory causes
- Cervical causes
- Uterine tubal causes
- Male causes
- Mixed female and male causes
- Mixed female causes
- Unexplained infertility

The infertile female classified according to time of infertility in to five categories

- A-1-2 year
- B-3-4 year
- C-5-9 year
- D-10-14 year
- E-over 15 years

We estimate the phycological status of the patients by administrating the hospital Anxiety and depression scale (HADS) test. The self-running Hands test consists of 14 survey questions. Seven of them is related to depression and the other seven is related to anxiety. The total score calculated. Score 1-7 regarded normal, score 8-10 considered borderline. While score above 11 considered abnormal.

Results: -

The total number of the involved infertile female was one hundred with mean age 30.3±6 years. The percentage of primary and secondary infertility was 61.8, 38.2 respectively.

The percentage and frequency of each mentioned infertility causes is illustrated inTable 1.The most significant cause of infertility was PCOS. There were statistically significant differences among the groups of the study regarding period of infertility and the nature of the disorder(X^2(N=1000) =262, P=0.001) Table 2.

26.1% of PCOS patients expressed 2-3 years infertility. While 50 %of patients with male factors infertility expressed +15-year infertility. 30.9 % of patients with mixed male and female factor of infertility expressed 5-9 years infertility. Table 3

28.3 % of participated women were obese & 22.3 % were with normal weight. 60 % of PCOS patients were overweight, 53% of infertile women with ovulatory causes rather than PCOS were overweight. Table 4

Only 18% of infertile female consume healthy diet, furthermore, 80% of them expressed uncontrolled weight. Table 5

Regarding Anxiety HADS score 74% of infertile women with infertility period more than four years old expressed anxiety score above 7 (borderline). 27.7 % of Infertile women above 40 years old express abnormal anxiety hands score. Table 7.The percentage of abnormal depression HADS score in young infertile women was 4.3% while it was 8.3% in infertile women above 40 years old. Table 6.

Table (1) distribution of subjects according to the Causes of infertility

Causes of infertility	**Frequency**	**%**
PCOS	350	35
Other ovulatory Factors	160	16
Cervical Factors	80	8
Uterine Tubal Factors	90	9
Male Factors	140	14
Mixed female &male factors	110	11
Mixed Female Factors	20	2
Unexplained Infertility	50	5

Table 2 Distribution of the study samples according to period of infertility and nature of disorder

Period of infertility	**PCOS**	**Other Ovulatory**	**Cervical**	**Uterine Tubal**	**Male**	**Mixed male & Female**	**Mixed Female**	**Unexplained**	**P value**
years	No	No	No	No	No	No	No	No	
1-2	92	63	28	15	27	16	3	9	**0.001**
3-4	136	42	20	18	13	25	5	11	
5-9	82	11	15	10	17	34	7	18	
10-15	28	22	10	20	13	15	3	5	
+15	12	22	7	27	70	20	2	7	

Table 3 Distribution of the Percentage of study samples according to the period of infertility

Period of infertility(years)	**PCOS**	**Other ovulatory**	**Cervical**	**Uterine tubal**	**Male**	**Mixed male & female**	**Mixed female**	**Unexplained**
1-2	26.1%	39.3%	35%	16.6%	19.2%	14.5%	15%	18%
3-4	39%	26.2%	25%	20%	9.2%	22.7%	25%	22%

5-9	23.4%	6.9%	18.8%	11.2%	12.1%	30.9%	35%	36%
10-15	8%	13.7%	12.5%	22.2%	9.3%	13.6%	15%	10%
+15	3.42%	13.7%	8.7%	30%	50%	18.3%	10%	14%

Table 4 Distribution of the Samples according to BMI

Causes of Infertility	**Normal BMI** **No %**	**Overweight** **No %**	**Obese** **No %**
PCOS	45 12 .8	210 60	95 27
Other ovulatory Causes	35 18.7	85 53	4025
Cervical factors	10 12.5	50 62.5	10 19.5
Tubal uterine Factors	30 33.3	4062.5	30 12.5
Male Factors	55 39.2	45 32.1	40 28.6
Mixed male & female Factors	25 22.7	35 31.8	50 45.5
Mixed female Factors	4 20	9 45	7 35
Unexplained infertility	20 40	15 30	1530
Total	223 22.3	484 48.4	283 28.3

Table 5Demonstrate, having healthy diet, weight control, physical activity, stress and smoking in all the study sample

	Yes		No	
Variable	No	%	No	%
Healthy diet	177	18%	823	82%
Weight control	201	20%	799	80%
Physical activity	180	18%	820	82%
Stress	564	55%	454	45%
Smoking	10	1%	990	99%

Table 6 demonstrate HAND score (Depression) forparticipated infertile women

		HADS Score (Depression)						P value
		Normal		Borderline		Abnormal		
Duration of infertility (years)	No	No	%	No	%	No	%	
1-4	547	435	79	102	18.6	10	1.8	
5-15+	453	185	41	200	44.2	67	14.7	
Age(years)								0.001

<30	230	170	74	50	21.7	10	4.3	
30-39	410	295	72	95	23	20	4.8	
>40	360	188	52	142	39	30	8.3	
Economic Status								0.001
High	80	60	75	15	18.7	5	6.2	
Middle	264	97	36.7	150	56.8	17	6.4	
Low	655	103	15.6	401	61.2	152	23.2	0.001

Table 7 demonstrate HAND score (Anxiety) for participated infertile women

		HADS Score (Anxiety)						P value
		Normal		Borderline		Abnormal		
Duration of infertility (years)	No	No	%	No	%	No	%	
1-4	547	150	27.4	380	69.4	17	3.1	
5-15+	454	110	24.2	293	74	50	11	0.001
Age(years)								
<30	230	170	74	41	17.8	19	8.2	
30-39	410	213	51.9	152	37	45	11	0.001
>40	360	109	30.3	151	42	100	27.7	
Economic Status								
High	80	41	51.2	32	40	7	8.7	
Middle	264	90	34	157	59	17	2.7	0.001
Low	655	95	14.5	411	62	149	22	

Discussion: -

Infertility is a widespread concern affecting millions of couples worldwide. The inability to conceive naturally can be emotionally and psychologically distressing, and navigating through the various causes of infertility can often be a daunting task.In an effort to gain a deeper understanding of this complex issue, one thousand infertile females involved in this study, we concentrated on the most prevalent causes of infertility in Azady teaching hospital in Kirkuk city, Iraq.While we can provide a general overview, it's important to note that the prevalence and causes of female infertility can vary between different countries due to differences in healthcare systems, cultural factors, and socioeconomic conditions. In the present study the frequency of

thecauses of infertility were PCOS, Other ovulatory factors, male factors, mixed male and female factor, uterine tubal, cervical factors and unexplained infertility respectively (Table 1). Similar to our study many studies around the world showed that the most common cause of infertility is PCOS (1, 2, 4, 13, 17-21). Other studies in India and Africa record other factors rather than PCOS to be the major cause of infertility (22, 23) This difference may be due to PCOS diagnosing criteria also, there is a racial difference in PCOS prevalence where PCOS can run in families taking in regard ethic variation in how PCOS manifest itself and it affect people (20, 24). Other ovulatory causes rather than PCOS were the second contributing factors for infertility in our study which is consistence with many studies (2, 17, 19, 25). Hypogonadotropic hypogonadism and diminished ovarian reserve. Thyroid disorders, hyperprolactinemia, luteinized unruptured follicle syndrome, ovarian dystrophy. Excessive exercise or low body weight: Intense physical activity or extremely low body weight can disrupt hormonal balance and interfere with ovulation. Ovarian cysts: Certain types of ovarian cysts, such as endometriomas all these are related to ovulatory causes of infertility rather than PCOS.

Comprehensive fertility evaluations were typically performed for involved females to identify potential barriers preventing conception,we found that 14% of the involved cases were those with male factor infertility and 11% were with both male and female factors. Regarding male infertility other studies recorded higher values than our studies (10, 17, 22, 25, 26)The reason is the most patients who attend infertilityCenter in AzadyTeaching Hospital were females during comprehensive investigations the male factor cause were ascertain.studying male infertility along with mixed male and female infertility is paramount due to its increasing prevalence globally. By understanding the causes behind these conditions through diagnostic methods such as semen analysis or inclusive infertility evaluations, appropriate treatment options can be implemented accordingly.

Unexplained infertility refers to cases where the cause of infertility cannot be identified despite a thorough evaluation of both the male and female partners. In the present study the percentage of explained infertility was 10% which is lower than studies in Africa and Pakistan also south Iraq(2, 22, 27).There are several possible reasons for unexplained infertility, including: Subtle or undetectable reproductive abnormalities: Some factors that contribute to infertility may not be easily identified through routine diagnostic tests. These could include minor abnormalities in sperm quality, egg quality, or embryo development. Ovulation issues: In some cases, irregular or unpredictable ovulation may occur, making it difficult to pinpoint the fertile window for conception. Fallopian tube function: Although the fallopian tubes may appear normal, there could be subtle abnormalities in their function that hinder the fertilization process. Sperm function: While routine semen analysis may indicate normal sperm parameters, there could be undetected issues with sperm function that affect fertilization. Egg quality: Even with normal ovarian function, the quality of eggs may be compromised, leading to difficulties in conception. To sum up the prevalence of unexplained infertility depends mainly on the availability and evaluability of the diagnosing tools and interventions.

In a subgroup analysis focusing on patients with an infertility period between one to two years, it was found that PCOS accounted for approximately 26.1% of cases. Other ovulatory disorders were also prevalent within this subgroup39.3%Table 3. These findings align with previous studies highlighting PCOS as a leading cause of female factor infertility in patients with infertility period less than six years (28).In another subgroup analysis focusing on patients with an infertility period between three to four years, it was observed that PCOS remained a significant cause but showed a slight decrease in prevalence compared to the previous subgroups. Other ovulatory disorders continued to contribute to infertility within this group This return to effectiveness of treatments also the impact of reproductive assisted reproductive technology where PCOS patients undergo IVF ,without additional cofounder are generally good prognosis patients (29). A different pattern emerges when examining patients who have experienced infertility for ten to fifteen years. In this subgroup, male and mixed female factors were found to be predominant causes (50%). Research has shown that women are generally more accepting and proactive than men when seeking treatment for infertility(26). This difference can be attributed to various social and cultural factors. Women may feel a stronger societal expectation or desire for motherhood, leading them to seek assistance for fertility issues. On the other hand, men may be more likely to accept childlessness due to societal norms or personal beliefs regarding fatherhood. In Iraq specifically, cultural factors influence women's reluctance to leave their husbands due to male factor infertility. The strong emphasis on family values and gender roles within Iraqi society can result in stigma and blame being placed solely on women if they fail to conceive. Additionally, Iraqi men may face challenges regarding embracing tests and undergoing lengthy procedures for infertility treatment due to cultural expectations of masculinity and societal.

In the present study we find that 76.7%of precipitated infertile female were overweight/obese. Moreover, 82% of these women consume un healthy diet that is rich in carbohydrate and fat Table (4,5). These finding is in consist with Papit and Peltzor(30) who demonstrated that only 30.8% of Iraqi people are with normal weight. Shaba et al(31) find that the prevalence of obesity is higher in married women in comparison with single one. Khalaf et al (32)demonstrated that the cause of obesity in Iraqi female is due to type of diet, style of cloth, sedimentary life style, genetic and eating habit.It's worth mentioning obesity causes peripheral aromatization of androgens to estrogen that affect gonadotropin release leading to disturbing neuro-regulation of hypothalamic pituitary gonadal axis, leading to further consequences for instance insulin resistance, leptin resistance decreases sex hormone binding protein, growth hormone and growth factor binding proteins. Obesity can decrease the success rates of fertility treatments such as in vitro fertilization (IVF). It can make it more challenging to retrieve eggs, reduce the quality of embryos, and increase the risk of complications duringpregnancy (33).

In this study the infertile women underwent mental evaluation by administrating Hospital Anxiety and Depression Scale test (HADS), then we associate the test result with duration of infertility ,age and economical status we found that 44.2% of infertile women with infertility period more than five years expressed borderline score of depression in HADS test not only that, 74% of them their anxiety score were more than 7 (borderline) this is very common globally a meta-analysis study done by Hazlina et al who demonstrated that.the risk of psychological distress among females with infertility is 60% higher than that among the general population. Furthermore, the risks of anxiety and depression are 60% and 40% times higher, respectively(34). Regarding the age, 8.3% of women above 40 were with abnormal depression scoreTable(6,7). The anxiety scores also showed marked increase with aging. Ogawa et al and Afshari et al(16, 35) also obtained similar finding they demonstrate that duration of infertility, age and economical status in infertile women are strong predictor for mental illness.

Infertility is a multifactual issue that affects not only the physical well-being of women but also their mental health. Iraqi women expressed mental illness at higher rate than other women(36) Inability to conceive can be emotionally devastating for women, and the cultural and social pressures surrounding women in Iraq further exacerbate these feeling of inadequacy and distress.Alasadi and Hussain (37)found that the prevalence of depression among infertile women in Basara city South of Iraq was 68% they believed that this high rate is significantly related to the type and duration of infertility and husband remarriage. The depression rate in infertile women in Iraq and some Arabic countries is higher than other countries(38) where adoption is legal and common .In contrast in Iraq religious andcultural believes allow men to have more than one wife, and female infertility gives them a good excuse to remarriage.Having children is often strongly associated with a woman's identity in most societies. Those with no children experience significant levels of stress and a sense of worthlessness because being a mother is associated with being female. A woman who is unable to conceive additionally runs the risk of experiencing social uneasiness and anxiety due to her fear of being alone in her senior years or in the event of illness in the future.(34)

Conclusion& recommendations: -PCOS is the most typical cause of infertility in this study. However, there may be other causes of infertility than PCOS for long periods of infertility. Among participating infertile women, obesity is prevalent. According to the study's findings, infertility has a significant influence on women in our society and can cause a variety of psychological symptoms, including depression and anxiety.

We advise making significant efforts in the media and press to explain the consequences of female obesity by offering nutrition education, suggestions, and interventions to promote healthy eating and physical activity.

One promising approach for managing depression and anxiety in infertile women in Iraq is through

psychological interventions. Psychological interventions aim to address the emotional distress associated with infertility and provide individuals with coping strategies and support. These

interventions involve the use of cognitive-behavioral therapy (CBT), which has been shown to be effective in reducingsymptoms of depression and anxiety in various populations.

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