Association Between Some Risk Factors with Hormonal State in a Sample of Infertile Iraqi Women

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ABSTRACT

Background: Infertility is a reproductive system disease affecting about 8–12 % of couples worldwide. Although IRAQ, in the last thirty years, has faced several instability crises in health problems and one of these problems is fertility status, few studies exist on women infertility in Iraq.

Aim of the Study: To examine the hormonal state of infertile Iraqi women.

Patients and Methods: The study included one hundred and eight women, fifty-one women with a history of infertility period of more than one year, in Al-Yarmook Teaching Hospital, Baghdad, Iraq, from September 2020, to April 2021

Results: The results of analysis showed that primary infertility was 61% and 39% secondary infertility, most cases in the age >25, PCOS where the main of female infertility causes, there was a significant relation between T4, T3, FSH, LH, Prolactin, E2, Testosterone, menarche, egg size and infertility in infertile Iraqi women.

Conclusion: This study's main findings were a high rate of primary infertility, effect of sex stroied hormones and menarche, and egg size. Future research should focus on the genotype of infertile family history and why Iraqi women seek to consult very late.

Keywords: Fertility, Hormonal state, Infertility, Mucin gene.

INTRODUCTION

Infertility is a global public health concern, defined as failure to achieve pregnancy within one year despite regular unprotected intercourse and affects approximately 8-10% of couples worldwide.[1] The World Health Organization (WHO) reports that one of every four women in developing countries is infertile.[2] The Iraqi women have a total fertility rate of about 4.5 children per woman, this study reported that maternal fertility has been declining in Iraq after 2003, and the war conditions have stimulated this decline.[3]

Infertility is called primary infertility if conception has never occurred, and secondary infertility if patients fail to the concept again after a previous successful conception.[4] It has been established that primary infertility is more common than secondary in Developing Countries.[5] There are many medical disorders related to female infertility which also play a critical role in the development of sexual dysfunction, like polycystic ovary syndrome (PCOS), which is considered as the most common cause of females anovulation. Uterine fibroids premature ovarian failure, as well as hormone disorders.[6,7]

MATERIAL AND METHODS

The study was performed in Al-Yarmook teaching hospital between September 2020 and April 2021 in Baghdad, Iraq. Hormonal tests have been performed in the hormones and Biochemical department in the same hospital. This study included one hundred and eight 108 subjects, 55 infertile women, and fifty-three (53) healthy fertile women, as a control group. The patients' criteria were: subject within their follicular phase, not using any hormonal treatment, and an average male-factor. Another criteria was that the subject, not arab ethnic, within follicular phase, third sex, and hypogonadism patients, have been excluded.

The principle of the control group inclusion was that no hormonal disorder with at least two previous complete pregnancies.

Both the patient and the control group were blood checked to investigate hormonal-related infertility in serum by auto analyzer ARCHITECT c4000 Methods Photometric, Potentiometric, and Turbid metric. The study also involve measuring the height (m), weight (kg), and waist-line (Abdominal circumference) was measured by tool and recorded

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in (cm) also body mass index (BMI) was calculated by dividing body weight in Kg the square of the height in (cm), and that according to the following equation:

$$BMI = Weight (Kg) / [height (cm)]^1$$

Data Collection Tools

Identifying the Information Form on Women with Infertility It is a questionnaire form consisting of about 30 questions designed by the researchers to determine the demographic characteristics of women. Data such as women's age, body mass index, educational status, employment status, economic situation, age of menarche, menstrual cycle, type and infertility causes, duration of the marriage, the status of having children, duration of treatment, family history, egg size, and previously applied infertility treatments are examined in this questionnaire form.

Statistical Evaluation of Data

Statistical analyses were performed using SPSS statistical package for Social Sciences (version 20.0 for windows, SPSS, Chicago, IL, USA). Quantitative data are represented as mean, standard deviation and median.

Qualitative data are represented as count and percentage. To test differences between the two groups, Student's t-test was used, and ANOVA test for the difference between the three groups. Chi-square test was used to test the relation of qualitative data. $p < 0.05$ was considered statistically significant.

RESULTS

In the recent study, the mean age of the infertile females was 27.5 ± 1.01 years, while the mean age of the control was 29 ± 1.2 years with a minimum of 1 year and a maximum of 25 years of infertility. In our study, we found that primary infertility form 61% with a mean infertile duration 4.0 ± 2.0 and 39% of our subjects are secondary infertility with a mean duration 2.0 ± 0.6 these result in the same line with another study in Tikrit 2020[9] increasing in infertility rates in reproductive age may be due to the delay in, the age of marriage, childbearing and asking medical consulting (Figure 1). In Africa, primary and secondary infertility are approximately equal tenth,[10] while a

study in Nigeria eleventh (11) and Nepal found that the primary infertility were (74.7%) from infertile women.[8]

Infertility causes are numerous and in the present study we found that the main causes of infertility in Iraqi Arab female is PCO 46%, ovarian reverse 20%, 10% for each of fallopian disorder & unexplained infertility, 8% uterine cyst, 4% hypothyroidism, and 2% endometrioses (Figure 2), however, study in Bangladesh and another a related study in Iran showed that the most common cause of female infertility was PCO as ovulation disorders (39.7%), which is consistent with the results of the current study.[8] Moreover, a related study in France found that one from each seventh woman will consult a doctor due to infertility problem during her reproductive age, and the main causes of female infertility of that study were PCO as ovulation disorders (32%), and tubal factors is seen as the essential cause for infertility in this study (26%)[9] while another study mention that tubal factor accounting 15.53% and came in second place after PCOs as ovulation factor.[12]

Relationship between demographic factors and fertility must continue to be explored to lessen the morbidity associated with infertility.[10] Table 4 illustrates the correlation between the type of infertility in patients' menarche, BMI, waist-line, duration of the marriage and consulting, previous healthy birth, abortion, egg size, and family history to the infertility patients. BMI, waist-line did not reveal any significant positive correlation with the type of infertility ($p > 0.05$). These correlations found that most frequent cases of primary and secondary infertility come from normal-weight women. that is accordance[2] and not contributed with study 2016 in north China that has been reported most frequent cases of women infertility were among underweight women.[11]

In this study (Table 1), marriage duration could be considered a significant predictor for secondary infertility; these results conflict with an Indian study that concluded primary infertility was a predictor factor.[12] Duration of marriage was reported in secondary infertility compared with primary infertility ($p = 0.034$). In opposite the duration of consulting in secondary is longer than primary infertility ($p = 0.030$). This result is in line with another study in Iran 2014[13]
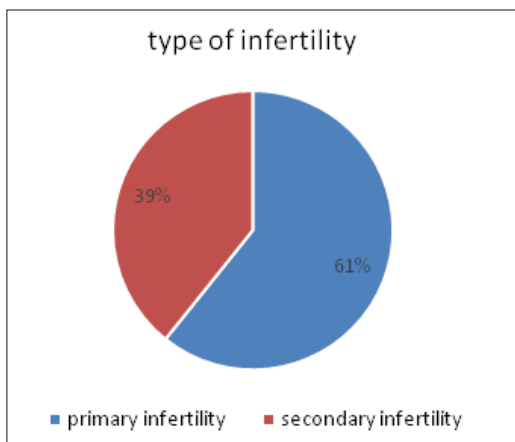

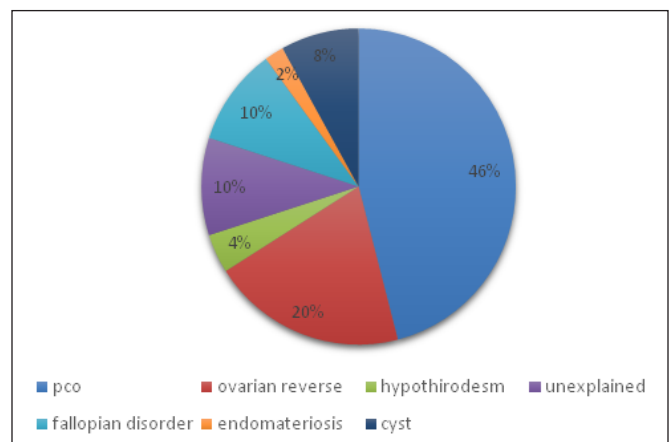
Figure 1: Type of infertility in Iraqi women

Figure 2: Infertility causes

Table 1: Correlation demographic parameter and type of infertility

	Type of infertility		
Parameters	Primary	secondary	p value
Menarche(DAY)	13.45 + 0.36	13.19 + 0.41	0.639
BMI(K/cm)	28.34 + 0.96	29.56 + 1.67	0.501
Waistline(cm)	43.13 + 0.72	43.05 + 1.17	0.948
Duration of marriage(y)	4.67+ 0.96	8.13 + 1.31	0.034*
Duration of consulting(y)	5.22 + 0.8	3.1 + 0.57	0.030*
Previous healthy birth(n)	0.00 + 0.00	1.10 + 0.35	0.005*
Abortion( )%	Positive 0%	Positive 40%	0.420
Egg size	12.88 + 1.56	17.50 + 0.87	0.014*
Family history (%)	Positive 31.0%	Positive 14.3%	0.201

Table 2: Relation between study groups according to their hormonal state

	Study groups		
Parameters	Infertile	control	p-value
T3	1.15 + 0.04	0.96 + 0.07	p = .001**
T4	6.88 + 0.21	6.70 + 0.23	p = 0.005*
TSH	1.77 + 0.18	1.58 + 0.22	p = 0.254
FSH	7.00 + 0.52	7.09 + 0.34	p = 0.005*
LH	5.45 + 0.60	4.30 + 0.36	p = 0.005*
E2	82.72 + 13.65	58.36 + 6.92	p = 0.005*
Prolactin	10.35 + 0.71	8.91+ 1.09	p = 0.005*
Testosterone	20.31 + 1.38	15.63 + 1.21	p = 0.005*

and disagrees with a study in Morocco that found the duration of infertility strongly related to secondary infertility.[14]

On the other hand, primary, infertile women showed 0.00 + 0.00, and 1.10 + 0.35 in secondary, which improved our selection and our primary infertile subject never had previous children. About 40% of secondary cases have at least one abortion improving that secondary infertility may cause by complications of childbirth, unsafe abortion, and all infections that may affect the uterus.[15] Frequent cases of primary cases came from women with positive family history first degree (31.0%) while that secondary infertility (14.3%) this is agreed with study in Iraq -Tikrit, Basra, Al-Nagaf, Iran, and Egypt.[5,6,13,16,17]

Furthermore, egg size showed highly mean in secondary 17.50 + 0.87, which is greater than egg size mean in the primary 12.88 + 1.56 (p=0.014), which agrees with the study done in Karbala.[18]

Hormones play an essential role in reproductive biology as well as in general physiology.[19] Table 2 explains the relationship between our study groups according to their hormonal state showing T3 in the fertile women was significantly lower than infertile group (p=0.001). This may be due to prolactin hormone, which recorded increased level as we well review below, recent results agree with the result in another report done in Tikrit city 2018 and another one done in Nigeria (2015).[16,20]

TSH level not significantly differed between groups (p>0.05), the same result was published in a paper about females in India and Tikrit city.[2,21] LH level was highest in inertial in comparison with control, this result may indicate to the ovarian disorder, so this result agrees with the previous study done in Baghdad, Samara, and another one done in Nigeria,[20,22,23] but not consistent with the outcome of the results in both India study[24] and Italian study[25] found a significant decrease in LH hormone concentration in the infertile compared with control.

A high concentration of LH in the present study may be considered an indicator of infertile women's high incidence rate. Poly Cystic Ovarian Syndrome (PCOS) may cause high levels of LH hormone in infertile women. Compared with the FSH hormone, it may reach (2:1), which disturbed the ovary, making Also, pointed that high LH hormone concentration indicates dysfunction in the pituitary gland. Prolactin hormones evaluated higher in infertility females than fertility control, which may cause ovulation deficiency, and considered as a reason for infertility in women in the current statistics goes with other studies confirmed the same result with Turkish,[26] same as testosterone hormone which increased in infertile Patients with infertility as compared with control these results agree with another.[27] That may be due to polycystic syndrome, which is a mean cause of infertility in Iraqi infertile women.

Hormonal Characteristics of the Studied Females According to Age Group

The p-values represent the difference between age groups in each studied female group.In the infertile group; only the TSH was significantly higher in the 25–35 years group from the other groups (p=0.01). That may be due to Prolactin increased in the same age range recently result like the previous study in Tikrit.[2] Other hormones were not significantly different according to age group (p>0.05). Recent study disagree with Croatia study[28] (Figures 3 to 5).

Menarche is the effect of complex interactions between hypothalamic-pituitary-ovarian hormones. FSH and LH hormones have a critical role in the age of menarche that it is stimulating causing an increase in ovarian production of estrogens Increasing estrogen levels to stimulate uterine endometrial proliferation and ultimately cause a surge of LH,
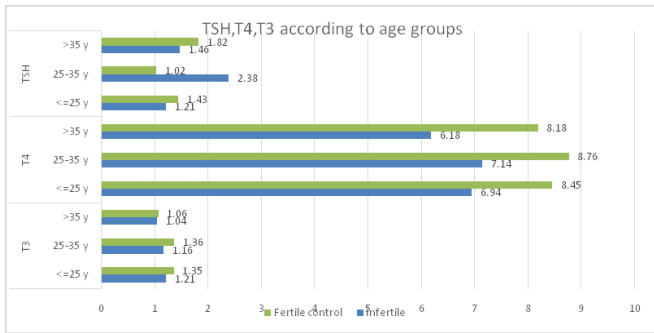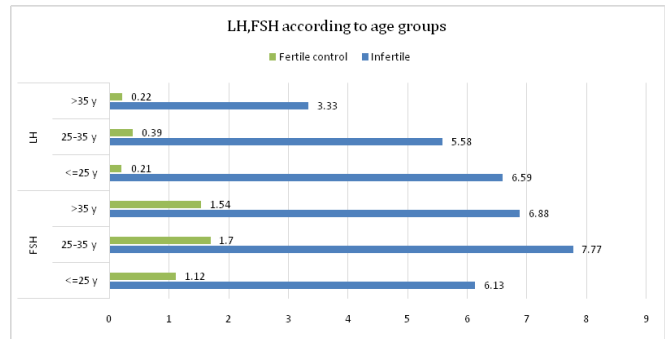
Figure 3: TSH, T4, and T3 according to age group
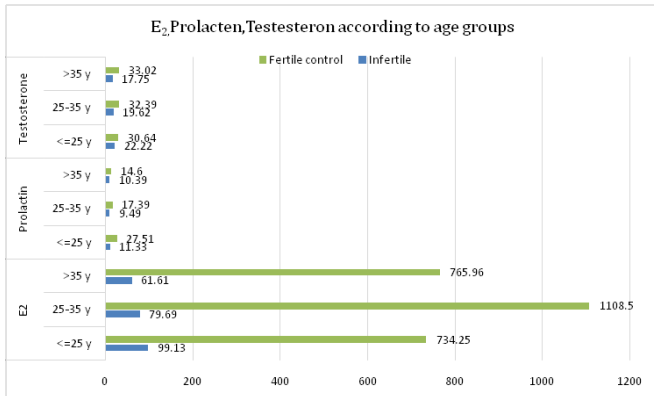

Figure 4: LH, FSH according to age group

Figure 5: E2, Prolactin and Testosterone according to age group

Table 3: Correlation between menarche, egg size, FSH, LH hormones

Tests		Egg size	menarche
FSH	r*	-0.116	0.388
	P-value	0.432	0.011
LH	r*	-0.189	0.170
	P-value	0.195	0.277

FSH production by the pituitary, which causes ovulation or rupture of the dominant the ovarian follicle.[29]

In a recent study, we found a significant correlation between egg size, menarche, FSH, and LH hormone of infertile patients (p=0.002), (p=0.011) that indicates early menarche represent Possible risk later in life among infertile women.[30]

Agree with another study in Austria suggested that the early menarche age were more associated with infertility problems like endometriosis,[30] also in Chinese research found that decreases Egg yield and matured eggs increasing age at menarche was associated with an increased risk of infertility.[31]

CONCLUSION

Most of the infertile cases were of age group 25–29 years. Ovulatory cause PCOS was the most common contributory factors among female infertile cases and presented a higher percentage of primary infertility that seeking for pregnancy after marriage while those with secondary infertility may have children before becoming infertile, first-degree infertility family history high significant in primary infertility, most infertility cases were found in women from normal weight, T4, T3, FSH, LH, Prolactin, E2, Testosterone all effect and indicate the problem of infertility in our study group, early age of menarche affect egg size and risk later in a lifetime among infertile women.

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