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Evaluation of Follicle Stimulating Hormone, Luteinizing Hormone and Prolactin Levels among Women with Unexplained Infertility in El-Beyda City

Om-alsaad E. I. Omar [1], Eman, G. A. Allafi[1], Fayrouz. A. khaled[2] and Marfoua. S. Ali[3*]

[1]*BiochemistryDepartment, Faculty of medicine, Omar El-Mokhtar University, El -Beyda-Libya*
[2]*Chemistry Department, Faculty of Science, Omar El-Mokhtar University, El -Beyda-Libya*
[3]*Zoology Department, Faculty of Science, Omar El-Mokhtar University, El -Beyda-Libya*
Corresponding Author: marfouas@yahoo.com

Abstract: *The prevalence of infertility is estimated to be between 12 and 14%. It thus represents a common condition, with important medical, economic and psychological implications. The aim of the study was to determine the studies follicle stimulating hormone (FSH), luteinizing hormone (LH) and prolactin (PRL) levels in infertile women. The study was carried out at the El-Beyda City, during the period from April to December 2017.The details pertaining to the patients regarding age, number of childbirth is furnished. The blood was collected during mid cycle, serum decanted and used for analysis. FSH, LH and PRL were estimated by Immuno enzymatic assay by Elisa Reader. The study involved (140) women. The results showed that the majority of studies women had normal hormonal levels according to the standard reference limits for FSH, LH and PRL. The study also showed that there was a significant positive correlation between the change in level of FSH, LH, PRL and the age of the studies infertile women. It was concluded that hormonal imbalance for (FSH, LH and PRL) is just an importance suspected etiologic factor in causing infertility.*

Keywords*: Prolactin Hormone (PRL), Follicle-stimulating (FSH), luteinizing hormone (LH), infertility and El-Beyda city.*

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I. Introduction

Infertility or the inability to conceive remains a problem of global proportions. It affects millions of couples in the world each year. It is estimated that globally 60-80 million couples suffer from infertility every year [(1)]. Female infertility affects estimated 48.5million women in the world with the highest prevalence of infertility affecting people in South-Asia, Sub-saharan Africa, North Africa/Middle east, Central or Eastern Europe or central Asia [(2)]. The cause of female infertility can be difficult to diagnose, but many treatments are available. Several lifestyle factors may affect reproduction, including habits of diet, clothing and exercise [(3)]. Fertility also declines with age. Female fertility is at its peak between the ages of 18 and 24 years [(3)]. Infertility may be caused by an underlying medical condition that may damage the fallopian tubes, interferes with ovulation, or causes hormonal complications. Hormonal anomalies that affect ovulation include hyperthyroidism, hypothyroidism, and hyperprolactinemia [(4)].Hormonal disturbances have been considered of great importance in the knowledge of causes and diagnosis of female infertility. Pituitary hormones such as thyroid stimulate hormone, prolactin (PRL) or growth hormone may act synergistically with follicle-stimulating hormone (FSH) and luteinizing hormone (LH) to enhance the entry of non-growing follicles into the growth phase [(5)]. An increase in FSH in women may indicate a reduction in the production of good quality eggs and embryos for fertilization, a woman's chances for pregnancy may be lower than expected for her age [(6)]. In women, LH is an important part of the menstrual cycle. It works in conjunction with FSH. The rise in estrogen tells the pituitary gland to stop producing FSH and to start making more LH. The shift to LH causes the egg to be released from the ovary, a process called ovulation [(7)]. PRL is a lactogenic hormone, and there are major functions for PRL: it promotes mammary gland development; initiates milk formation and maintains milk secretion by the mammary glands [(8)]. The female infertility are caused by ovulation disorders. Deficiencies in LH, FSH and elevated PRL level even slight irregularities in the hormone system can affect ovulation. The infertility causes due to insufficiency or imbalance hormones [(7)]. The aim of the present study was to estimate the mean value of FSH, LH, and PRL levels among women population who get problem in infertility in El-Beyda City-Libya.

II. Methodology

The study was conducted on a total number of 140women between the age group of 17 and 50 years during their routine visit to the clinical Center in El-Beyda city in Libya from April 2017 to December 2017. These subjects were pre-diagnosed symptoms related to fertility. The diagnosis of patients was established by hormonal tests (serum FSH, LH and PRL tests). Venous blood sample (5ml) was collected from each subjects at 2^{nd} -4^{th}day of menstrual cycle. Each sample centrifuged for serum separation (4000 r.p.m./10 mins.). The serum was isolated into three parts for PRL, FSH and LH tests, which performed by enzyme immunoassay method using commercial kits and spectrophotometer (Humalyzer Junior). The subjects were classified upon their medical diagnosis. Data collected was entered and analyzed in Microsoft Excel.

Determination of hormones levels

Immunological test for quantitative in vitro determination of prolactin in human serum and plasma. The execution of the I mmuno A ssay in E ldro C hemi L uminescence "ECLIA" from Roche Diagnostics cobas Elecsys® Prolactin 11 CalSet (Italy) was used.ST AIA-PACK LH II and ST AIA-PACK FSHare designed for IN-VITRO DIAGNOSTIC USE for the quantitative measurement of luteinizing hormone (LH) and quantitative measurement of follicle stimulating hormone (FSH) respectively in human serum or heparinized plasma on Tosoh AIA immunoassay analyzers (Japan) with Automatic Enzyme Immunoassay System were used.

III. Results

This study concluded about 140 samples of women's serum, these samples were analyzed for three hormones. These included FSH, LH and PRL at 2^{nd} -4^{th}day of menstrual cycle. The reference range for the FSH was 4.5-to- 11MlU/ml, for the LH was 1.7-to-13.3MIU/ml and for the PRL was 4.1-to 28.9ng/ml. The manufacturers of the assay kits recommended these ranges for these units. Demographic patients' characteristics of 140 subjects are presented in (Table 1-3 and Figure 1). According to this study, of the 140subjects, mean age of patients was 33.18 years. Age distribution relating to 140 established subjects by age groups was shown in (Table 1). The study subjects were divided into eight different age groups. Age of the patients varied between 17 years to 50 years. The highest prevalence of the infertility problem was found in the age group (26-30 till 36-40) years. Table 2 showed the hormonal characteristics of the 140 subjects when compared to normal values for three hormones. The Mean ± SD for FHS, LH and PRL were found with statistically significantly decrease in case of hypo-value and statistically significantly increase in case of hyper-value comparison with normal values. From our results, of the 140 female subjects 38.6, 16.43 and 19.3% of case were suffered from hyper values in FSH, LH and PRL and 2.9, 1.4 and 2.14% for hypo values in FSH, LH and PRL respectively compared with normal values. Regarding medical diagnosis for 140 subjects was illustrated in Table 3. Around 8.57% of total cases was diagnosed with primary infertility. Around of (89.3 %) of total subjects was diagnosed with secondary infertility and most of them get married more than three years. Regarding number of pregnancy, 53. 57, 15, 13.57 and 5% of total case were found no pregnant (P0), give one birth child (P1), give two birth child (P2),give three birth child (P3) and give four birth child (P4) respectively. Only 3 cases were suffered from bleeding and all of them with age ranged from 49-50 years. Figure 1 shown more details about previous finding about subjects who diagnosis with secondary infertility (P0). In these subjects, of the 75 female subjects 20, 16 and 14.76% of case were suffered from hyper values in FSH, LH and PRL and 1.3, 0 and 1.3% for hypo values in FSH, LH and PRL respectively compared with normal values.

Table 1: Demographic distribution of subjects among different age groups

Age in years	No (%)
15-20	11(7.86 %)
21-25	22 (15.71 %)
26-30	30 (21.43 %)
31-35	24 (17.14 %)
36-40	23 (16.43 %)
41-45	21 (15%)
46-50	9 (6.43 %)
Total	140 (100%)

Table 2: Mean levels of FSH, LH and PRL in study women population

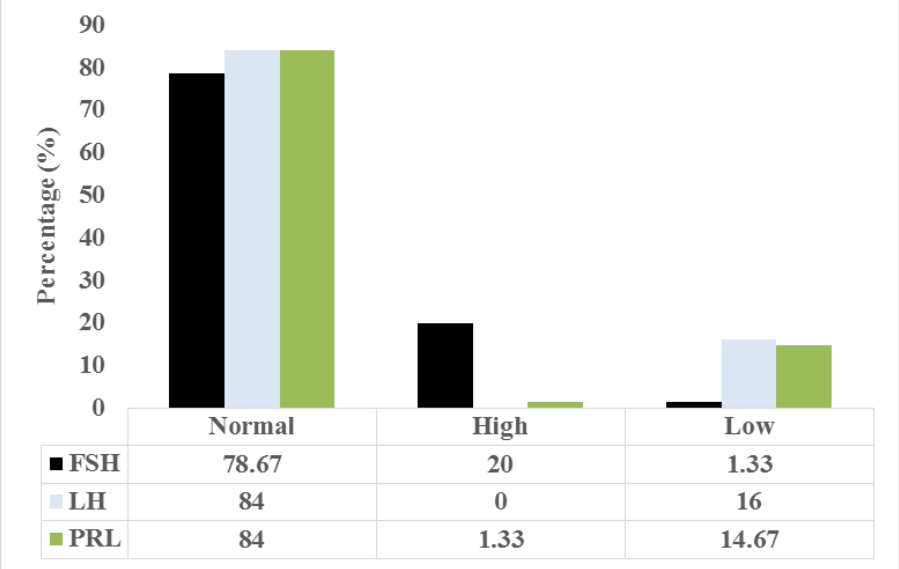
Parameters		**No. (%)**	**Mean± SD**	**T-test**
FSH (4.5-11MIU/ml)	Normal	82 (58.5%)	7.97± 1.62	
	Hypo	4 (2.9%)	2.85± 1.29	0.01464[b]
	Hyper	54 (38.6 %)	27.75± 20.98	0.00135[c]
LH (1.7-13.3MIU/ml)	Normal	115 (82.14 %)	7.11± 2.58	
	Hypo	2 (1.4 %)	1.65±0.49	0.00566[c]
	Hyper	23 (16.43 %)	23.06± 10.60	0.00101[c]
PRL (4.1- 28.9ng/ml)	Normal	110 (78.6 %)	14.55± 5.43	
	Hypo	3 (2.14 %)	3± 0	0.00096[d]
	Hyper	27 (19.3 %)	36.44± 8.71	0.00158[c]

Data are expressed in mean ± SD Different superscripts are significant

Table 3: Medical diagnosis in study women population

	Diagnosis	**No (%)**
	Primary Infertility	12 (8.57 %)
Secondary Infertility	**No. of Pregnancy (P0)**	75 (53.57 %)
	No. of Pregnancy (P1)	21 (15 %)
	No. of Pregnancy (P2)	19 (13.57 %)
	No. of Pregnancy (P3)	7 (5%)
	No. of Pregnancy (P4)	3 (2.14 %)
	Bleeding	3 (2.14 %)
	Total	140 (100%)

Figure 1: Percentage of FSH, LH and PRL in study women population who diagnosis with P0



IV. Discussion

The failure to identify a clear cause of the infertility after a full screening of females is defined as infertility of unknown cause [(9)]. The levels of FSH, LH and PRL gonodotropic hormones in infertile women were evaluated by many researchers. The current study was designed to correlate age with serum levels of FSH, LH and PRL among women population in El-BeydaCity who diagnosis with problem related to infertility. The highest prevalence of the infertility problem was found in the age group (26-40) years. This result is widely

accepted that during the last twenty years, the average age of getting marriage and having children has increased and this is a key factor for infertility. As the age of giving birth is increased, the reproductive capacity is decreased upon age [(10)]. The level of FSH on 2nd to 4th day of the cycle is within the normal range in most subjects. But they are on the lower side such a decrease in the ovarian reserve causes infertility.

From our results, of the 140 female subjects 38.6, 16.43 and 19.3% of case were suffered from hyper values in FSH, LH and PRL and 2.9, 1.4 and 2.14% for hypo values in FSH, LH and PRL respectively compared with normal values. Among them 140, the level of FSH and LH on 3rdof the cycle are within the normal range for most subjects. The decreased level of LH in the mid-cycle clearly indicates possibility of anovulation, causing infertility. According to previous study higher level of FSH, LH in infertile women with a proper menstrual cycle is rarely found [(11)]. Another study also states that women with higher values of PRL and luteal phase defects have lower levels of FSH, and LH during their menstrual cycle [(12)]. However, the increase in FSH levels as a consequence of follicle depletion can start very early during reproductive age and tends to accelerate after age 37 years [(13 and 14)].One study has reported that women may begin to have a subtle increase in their serum FSH concentrations in their middle 30s, coinciding with the time at which fertility begins to decline [(15)].The serum PRL concentration was found in normal range for 78.6% for total subjects and 16.3 % of them diagnosed with hyperprolactinemia. Many studies indicated hyperprolactinemia as the cause for infertility in female [(16-18)]. Other studies by [(10, 19 and 20)] found a significant association between hormonal imbalance and female infertility. The elevated levels of PRL hormone are very common in infertile women as compared with fertile women [(20-22)]. High levels of circulating PRL, in physiology and pathological situations, are known to cause infertility [(23)]. FSH and LH play a very important role in follicle development and oestrogen production. The hormonal imbalance is associated with infertility in women. The increased or decreased levels have an impact on ovulation and menstruation [(24).]

V. Conclusion

The present study on FSH, LH and PRL levels in infertile women evaluates the hormonal profile of infertile women with an ovulatory menstrual cycle. Women over 40 years old, especially those with elevated basal FSH. LH and PRL levels, should be informed of the low chance of pregnancy. The study clearly indicates to understand the hormonal levels in infertile women which caused the change in the levels of FSH, LH and PRL.

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