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RESEARCH ARTICLE

A PROSPECTIVE STUDY OF HORMONAL CHANGES AMONG SUDANESE WOMEN WITH INFERTILITY

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ABSTRACT

Background: Infertility a global health problem with an increasing incidence. In view of the increasing number of infertility among Sudanese women, that has an impact on ovulation and menstruation and other complications, this study was conducted to determine and evaluate luteinizing hormone (LH), follicle stimulating hormone (FSH), prolactin (PRL) that may help and facilitate the diagnosis and flow up of this disease.

Materials and Methods: A prospective analytic, cross- sectional and hospital-based study included Sudanese women from Khartoum- State- Sudan, in period from March 2012 to May 2014. A total of 200 infertile Sudanese women were compared with 100 fertile women as control group, all of them were age- and weight-matched, Samples were taken then serum luteinizing hormone(LH), follicle (LH) stimulating hormone (FSH), Prolactin (PRL) levels were analyzed using ELISA technique.

Results:

Hormones:

The (mean ± SD) of serum luteinizing hormone, follicle stimulating hormone and prolactin levels in an infertile Sudanese women 14.60±9.8 mIU/ml, 6.51±2.04 mIU/ml, 397.95±25.17 ng/ml, respectively, while that of fertile women (control group), the (mean ± SD) of serum luteinizing hormone, serum luteinizing hormone, prolactin were 7.00±5.26 mIU/ml, 8.13±3.88 mIU/ml, 249.15±25.76 ng/ml, respectively.

Serum level of luteinizing hormone, prolactin were significantly elevated in an infertile women and follicle stimulating hormone level was reduced in compression to control group (P<0.05).

Conclusion: Patients with infertility have significant increase levels of Serum level of luteinizing hormone, prolactin, while serum level of follicle stimulating hormone (FSH) concentration was reduced in patients.

INTRODUCTION

Infertility remains a global health problem with an increasing incidence. It is estimated that worldwide, between 70 and 80 million couples suffer from infertility, and most of these are residents of developing countries, including the Middle East (Ismail *et al*., 2010). Infertility defined as the inability to conceive after at least 1 full year of unprotected sexual intercourse (Boivin *et al*., 2007). Infertility is a major problem in these countries and causes extensive social and psychological suffering (Pennings *et al*., 2009).Complex biological processes in the mammalian ovary, such as follicular development, oocyte maturation, oocyte meiosis, ovulation and corpus luteum formation and demise, or coordinately regulated by autocrine, paracrine and endocrine factors of the hypothalamic- pituitary- ovarian axis (Satoh *et al*., 2009).

Specifically Follicle Stimulating Hormones (FSH) is a major promoter for orchestrating follicular development and differentiation in the granulosa cells of preovulatory follicles (Wayne *et al*., 2007). Luteinizing Hormone (LH) plays a key role in initiation of the ovulatory process of preovulatory follicles by activating multiple cellular signaling pathways (Russell *et al*., 2007). Hormonal balance between estrogen, progesterone, FSH and LH is important to induce and promote fertility. The most common cause of female infertility is ovulatory disorder characterized by an ovulation or by infrequent and/or irregular ovulation. (Elghblawl *et al*., 2007). The major causes of infertility includes ovulatory dysfunction (15%), tubal and peritoneal pathology (30-40%), an dmale fact (30 -40%) and uterine pathology. To some extent the prevalence of each varies with age. Ovulatory dysfunction is mo re common in younger than old couples, tubal and

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peritoneal factors have a similar prevalence (Mohan *et al.,* 2010). An elevation of prolactin (hyperprolactinemia) is thought to be a frequent cause of chronic an ovulation and infertility serum prolactin (PRL) levels were also studied as a marker of infertility (Veena *et al.,* 2008). Deficiencies in luteinizing hormone (LH), follicle stimulating hormone (FSH) and elevated prolactin level even slight irregularities in the hormone system can affect ovulation.

The infertility causes due to insufficiency or imbalance hormones. The lack of ovulation may lead to mild enlargements of ovaries especially in obese patient. The objectives of this study therefore was to determine the levels of follicle stimulating hormone(FSH), luteinizing hormone (LH) and prolactin (PRL), in infertile women which will help to assess the contribution of endocrine abnormalities to infertility in the study population. as a risk factor for infertility and attempted to find the correlation between FSH and LH

MATERIALS AND METHODS

Reagents

All chemical reagents were purchased from Bio system company (Spine Company for Analytical material and chemical Reagents).

Subjects and study population

The present study was descriptive, analytic, cross- sectional and hospital-based study, carried out in Khartoum State educational hospital, Sudan. 200 hundred an infetirile women and 100 healthy women, all of whom were age and weight-matched, were studied. Blood samples were obtained after an overnight fast for measurement of luteinizing hormone, follicle stimulating hormone, prolactin level.

Samples collection and preparation

The blood samples were drawn after overnight fasting in the morning (between 0800 and 1100 h).Five ml blood from each individual of study population, were collected from both cases and control, the blood was centrifuged at 3000 rpm for 10 minutes and serum was obtained luteinizing hormone, follicle stimulating hormone, prolactin were stored in -20 C and were analyzed within 7 d of sampling. Using ELSIA technique to determine hormones levels.

Statistical analysis

Data were analyzed by computer program (SPSS) version IBM 20. Student T. test was used for the Calculation. P≤0.05 was considered significant.

Calculation of body max index

The physical examination of body weight was calculated by taking weight in kilogram (kg) (Verma *et al.,* 1982) and height was measured in centimeters (Frisancho *et al.,* 2010). The Body Mass index was calculated from the formula; BMI = weight in kilograms / (height in squared meters). Patients

were taken as obese if their body mass index was 29.9 (Olefsky l *et al.,* 1992).

RESULTS

Table 1 showed the baseline characteristics of patients with infertility and control group. In this study all participants were similar for age, but body mass index (BMI) was significantly higher (p<0.001) in infertility women as compared with the control group. The mean levels of FSH and was significantly decreased (p<0.05) in infertility women than in the control. There was a significant increased (p<0.05) in serum PRL, while the mean Luteinizing hormone, concentration was significantly higher (p<0.001) in women with infertility as compared to control group. There was no clear significant correlation found between FSH and LH, figure 1. There was a significant increased in the BMI among case study in comparison to control group. Figure 2 shows the percentage of BMI distribution among case study.

Table 1 Mean ± SD Baseline characteristics of patients with PCO and control group.

Variable	PCO group	Control group	P. value
Age/years	29.61±5.41	31.23±4.93	0.060
Weight/Kg	72.83±10.88	68.03±11.31	0.030
Height/Cm	160.00±6.00	162.60±5.52	0.210
Height/Cm	29.76±4.24	24.14±3.76	0.001

P. value <0.05 is statistically significant.

Table 2 Mean ± SD of lipid parameters in the PCOS group and control group.

Parameters	PCOS group	Control group	P. value
LH mIU/ml	14.60±9.80	7.00±5.26	0.001
FSH mIU/ml	6.51±2.04	8.13±3.88	0.002
PRL ng/ml	397.95±25.17	249.15±25.76	0. 005

P. value <0.05 is statistically significant.

In this study a test group of 200 patients with infertility were compared to 100 apparently healthy volunteers, both groups were matched for age and height. Weight and body mass index were significantly raised in patients with infertility compared to controls, according to interpretation of BMI, 51% were found to be overweight. (BMI between 25 and 29.9 Kg/m²), 36.6% were obese (BMI > 30 Kg/m²), whereas 11.5% were found to have normal reference weight (BMI between 19 and 25 Kg/m²), and only 1% were found to be under weight (BMI < 19 Kg/m²).

Serum luteinizing hormone

Table 2 shows a highly significant difference between the means of serum LH of the test group (n=200) and the control group (n=100). Mean ± SD :(14.60±9.8) versus (7.00±5.26) mIU/ml, P=0.001. The current study shows (figure1) a significant, strong positive correlation between the Luteinizing hormone and the serum levels of Follicle stimulating hormone in women with infertility.(r = 0.60, p =0. 00). In this study 89 subjects with infertility (44.5%) had abnormal high serum levels of luteinizing hormone.

Serum follicle stimulating hormone

Table 2 shows no significant difference between the means of serum FSH of the test group and the control

group Mean ± SD: (6.51±2.04) versus (8.13±3.88) mIU/ml, P=0.001. In this study 7 subjects with infertility (3.5%) had abnormal high serum levels of Follicle stimulating hormone.
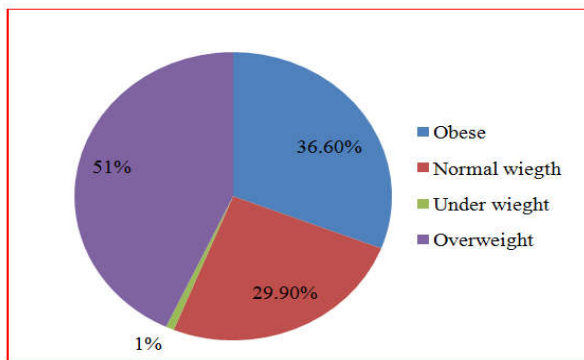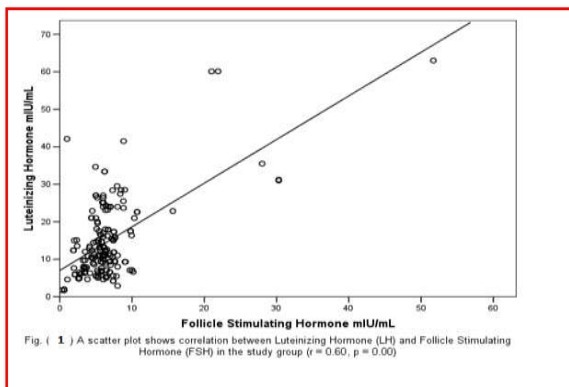

Fig. (1) A scatter plot shows correlation between Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) in the study group (r = 0.60, p = 0.00)

Figuer 2 distribution of percentage of BMI among case study

Serum prolactin

Table 2 shows a highly significant difference between the means of serum PRL of the test group and the control group Mean ± SD: (397.95±25.17) versus (249.15±25.76) ng/ml, P=0.005. .In this study abut27 subjects with infertility (13.5%) had abnormal high serum levels of prolactin.

DISCUSSION

Infertility remains a global health problem with an increasing incidence. It is generally defined as one year of unprotected intercourse without conception. Approximately 85-90% of healthy young couples conceive within one year. Infertility affects 10 -15 % of couples, is an important part of investigation and helps the couple to have children (Mosher l et al., 1991). Many people may be infertile during their reproductive years. They may be unaware of this infertility. Many parameters are outlined for the cause of infertility like age, lifestyle and physical problems etc. This study indicate a significantly decrease in FSH levels, and this result was agreement with Jose-Miller et al study which, found a decrease level of FSH in infertility women that causes ovulation failure, subsequently failure in the role of genital glands and menstrual cycle which lead to infertility (Jose l et al., 2007). Several researches confirm the role of high concentration of LH after ovulation stimulates the granulosa cell of the ruptured follicle to luteinize and to form the corpus luteum which synthesizes and secrets progesterone and estradiol. Progesterone is the

principle hormone of the luteal phase and prepares the endometrium for the implantation of fertilize ovum. Whereas the decreased levels of LH was accompanied with rises of prolactin levels in blood, Kallman syndrome and decrease guandotropin (Sadler et al., 2004, Goldman et al., 2004). Veena Bhaskar et al) found that serum PRL levels is a marker of infertility and determine its relation to oxidative stress and antioxidants (Veena et al., 2008). High circulating levels of PRL may inhibit ovarian function and ovulation by both central and peripheral mechanisms (MatsuzakiS l et al., 1994). The presence of elevated LH/FSH concentrations with a decreased estradiol concentration is diagnostic of hypergonadotrophic hypogonadism (Madhuka et al., 2009). Our study observed that there was a significant, strong positive correlation between the Luteinizing hormone and the serum levels of Follicle stimulating hormone in women with infertility, this agrees with study reported by (Taylor et al. 1997) who found that LH/FSH the ratio may be elevated in up to 95% of subjects, if women who have ovulated recently are excluded. LH levels may be influenced by the temporal relationship to ovulation. The present study demonstrated that there was a significant increased in the body max index in comparison to control group, our data which we are found suggest that the majority (more than 83%) of patients with infertility in the present study have BMI above the normal reference limit. These results revealed to increase infertility with increasing BMI. The higher BMI in women can cause insulin levels to increase. This can cause testosterone not to be converted into estrogen. The bottom line here is that the ovaries will not release eggs without sufficient estrogen production (WHO, 2000).The infertility was increased with hormonal imbalances (FSH, LH, and PRL) that have an impact on ovulation and menstruation. Catalano et al, found that excess weight is in not only link to increased risk of chronic disease, but also shown to increase the risk of reproductive problems(Catalano et al., 2007).Several studies have shown that women with excess body weight are more likely to have fertility problems (Gesink et al., 2007).

CONCLUSION

In conclusion, Results of the present study showed that hormones play a crucial role in infertile women, as was reflected by the clear decline in the level of FSH and increased of LH / FSH ratio. This study confirmed that hyperprolactinemia was observed in women suffering from infertility. Hyperprolactinemia increased with increase in BMI and obesity in infertile women. More studies are needed to give a clear vision on the roles of others hormones in infertility of women

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