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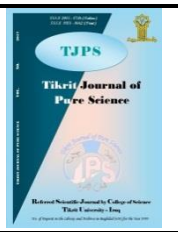

Evaluation of the impact of the level of (Testosterone, Luteinizing Hormone, Follicle-Stimulating Hormone and Prolactin) on some semen parameters in infertile males

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Abstract

Infertility is considered a medical condition in which the population suffers. It has several causes, including hormonal disturbance and its effect on altering sperm parameters. This study was designed to estimate the level of hormones (Testosterone, Luteinizing Hormone (LH), Follicle-Stimulating Hormone (FSH) and Prolactin) for infertility group, and the potential effect of these hormonal variables on semen parameters. The study included 50 men who were selected as an infertile group unable to conceive. In contrast, 20 healthy men were selected and able to fertilize and be considered as an control group. The level of serum Testosterone, FSH, LH and Prolactin was measured by Mini VIDAS of using ELFA method. Semen analysis was carried out according to WHO recommendations. The results showed a significant decrease in the average level of Testosterone in the infertile group (1.89±0.67ng/ml) compared with control group(4.95±1.22 ng/ml), ($p<0.01$). The average FSH and Prolactin level were significantly higher in the infertile group (7.15 ± 7.5 m IU/ ml , 25.56 ± 18.56 ng/ml) respectively compared with control group (2.8 ± 0.84 m IU/ml , 12.8 ± 2.51 ng/ml) ; ($P <0.05$, $P < 0.01$) respectively. As for the level of Luteinizing Hormone (LH), there were no statistically significant differences between infertility group and control group. The sperm count, Active motile, Sluggish motile and Normal sperm in the infertile group was less than the control group with a significant difference ($P < 0.01$).

Conclusion: It is been concluded that the disturbance in semen parameters of men infertility is due to the disturbance in the level of reproductive hormones, and that any modification in the level of hormones may contribute to improve sperm parameters.

Introduction

Male infertility is defined to a male inability to achieve pregnancy in a fertile female after one year or more of regular unprotected sexual intercourse [1,2,3] Infertility affects 15% of couples globally[4], that male infertility is responsible for approximately 30 % of infertility Cases[5], 35 % of infertility cases are solely due to female factor, and 20 % of infertility cases from combination of two, and 15% unexplained [6,7]. A major portion of these sub-fertile men are classified as having unexplained male infertility[8]. generally the male infertility is due to problems that affect either sperm production (genetic causes or Chromosomal, Radiation damage, Torsion, Heat, Varicocele, Medicines, chemicals and failure of the testes to descend at birth), sperm transport (Prostate-related problems, Vasectomy, Infections), ejaculatory disorders, hormonal imbalances and deficiencies in the semen. If the number of sperm a male ejaculates is a poor quality or low, it will be Hard, and sometimes unattainable, for him to cause a conception[9,10,11,12]. Also among the main causes of male infertility is the presence of antisperm antibodies and nutritional deficiency of trace elements [13,14]. The process of sperm production is

subject to the hypothalamus-pituitary-testicular axis, Pituitary gonadotropins include follicle-stimulating hormone (FSH) and luteinizing hormone (LH), are essential for reproduction[15]. The gland hypothalamus secretes Gonadotropins Releasing Hormones (GnRH), GnRH stimulates pituitary to synthesis and secretion of the follicle-stimulating hormone (FSH) and luteinizing hormone (LH), where FSH is critical for sperm production (spermatogenesis), While LH stimulates synthesis and secretion of testosterone through stimulation the leydig cells located in the testes to produce testosterone hormone, which act together with FSH on the seminiferous tubules (sperm-producing tubes) in the testes to make sperm, the primary source of hypothalamic feedback inhibition is the serum testosterone[16], also testosterone is important in the development of male characteristics, including strength, muscle mass, bone mass, fat distribution and sex drive[17,18]. Prolactin is another hormone which is secreted from pituitary gland and has an important role in male spermatogenesis. Prolactin may have a physiological role in the regulation of testosterone [16], Hyperprolactinemia may causes infertility in about 11% of oligospermic males[19], prolactin controlled both LH and FSH production via the regulation of GnRH, the rising level of prolactin will decrease the GnRH secretion by slowing the frequency of GnRH pulses thereby reducing FSH and LH pulsatility [19,20, 21, 22].

Material and methods

The study was carried out on patients attending to **the** Al-Batoul Hospital for childbirth/ Diyala, between February and September 2017. The study included (50) infertile men subjects, those who had regular sexual intercourse for at over one year without pregnancy. The study was conducted with the consent of the patients involved, Patient's information were collected by a structured questionnaire. The semen sample was collected in sterile plastic containers by masturbation in a private room in the lab after 3-5 days sexual abstinence. Semen parameters were analyzed according to World Health Organization (WHO) guideline (WHO Lab Manual, 1999)[23], Based on the results of microscopic examination for semen, men whose (sperm count <20 million/ ejaculate, n=50) with abnormal motility and morphology taken as a infertile group (Oligozoospermic and/or asthenospermia), and 20 fertile men volunteer whose partners had conceived within one year and having sperm count more than 40 million/ejaculate with normal motility and morphology taken as normozoospermic control group. Blood samples were obtained from fertile and non-fertile men by withdrawing (5 ml) of venous blood, then placing blood in a special tube, after coagulation is complete, the serum is separated from the clotted blood cells using a centrifugation at 5000 rmp for 10 minutes. The serum was stored at -20^{o}C in plain tube until processing Serum levels of Hormone (FSH, LH, Testosterone and Prolactin) were measured by Mini VIDAS of using ELFA method (Enzyme Linked Fluorescent Assay).

Statistical analysis

All data were analyzed using the statistical analysis program SPSS. The data were expressed as (mean ± SD) in addition to the use independent samples t-test based on the value of (P) less than 0.01 or 0.05 was considered significant.

Results

After Semen parameters were analyzed according to World Health Organization (WHO) guideline (WHO Lab Manual, 1999), The results shown in Table (1) were obtained after the statistical analysis of the results of the microscopic examination of semen. The table included the (mean ± SD) of sperm count, sperm motility and morphology.

Table (1) shows the mean (± SD) and the *P* value for the age, volume, sperm count, sperm motility and morphology in two groups

Parameter	Group	No.	**Mean ± SD**	P
Age (years)	control	20	29.40 ± 5.57	
	Infertile	50	31.74 ± 6.76	P > 0.05
Volume (ml)	control	20	3.18 ± 0.7	
	Infertile	50	2.6 ± 2.08	P > 0.05
sperm count million/ejaculate	control	20	81.87 ± 32.94	
	Infertile	50	13.03 ± 11.55	P < 0.01
Motility				
Active motile %	control	20	41.25 ± 9.9	
	Infertile	50	5.93 ± 11.26	P < 0.01
Sluggish motile %	control	20	27.5 ± 9.63	
	Infertile	50	14.4 ± 10.59	P < 0.01
Immotile sperm %	control	20	32.5 ± 10.35	
	Infertile	50	70.56 ± 17.5	P < 0.01
Morphology				
Normal sperm %	control	20	69.92 ± 5.8	
	Infertile	50	34.07 ± 26.4	P < 0.01
Abnormal sperm %	control	20	30.83 ± 5.14	
	Infertile	50	64.15 ± 27.42	P < 0.01

As shown in Table (1), the average age and volume of seminal at infertile group was near to the average age and volume of the control group, With no statistically significant differences between fertility and infertility group, (P>0.05). As expected, the sperm parameters of the infertility group were not within the WHO reference range. The sperm count, Active motile, Sluggish motile and Normal sperm in the infertile group was less than the control group with a significant difference ($P< 0.01$). The results in Table (1) showed that the Immotile sperm and Abnormal sperm in the infertile group were significantly higher than the control group, ($P< 0.01$).

Table (2) shows the mean (± SD) and the *P* value for the level of testosterone, FSH, LH and prolactin hormones in two groups

Parameter	Group	No.	Mean ± SD	P
Testosterone (ng / ml)	control	20	4.95 ± 1.22	P < 0.01
	Infertile	50	1.89 ± 0.67	
FSH (m. IU / ml)	control	20	2.8 ± 0.84	P < 0.05
	Infertile	50	7.15 ± 7.5	
LH (m. IU / ml)	control	20	4.8 ± 1.78	P > 0.05
	Infertile	50	4.14 ± 2.9	
Prolactin (ng / ml)	control	20	12.8 ± 2.51	P < 0.01
	Infertile	50	25.56 ± 18.56	

As shown in Table (2), The level of testosterone in the infertile group was lower than the control group with statistically significant differences ($P<0.01$), The level of FSH hormone in the infertile group was higher than the control group with a significant difference ($P<0.01$), While the level of the LH hormone in the infertile group, there was no statistically significant difference compared with control group, (P>0.05), The results in Table (2) showed that the prolactin level in the infertile group (24.45 ± 18.1) were significantly higher than the control group (12.8 ± 2.51), ($P < 0.01$).

Discussion

The study was conducted on men with infertility who suffer from a decrease in the sperm count from the minimum (Oligozoospermic and/or asthenospermia) and thus the lack of access to fertility and conception. The level of testosterone showed a significantly reduce in infertile group (Oligozoospermic and/or asthenospermia), ($P <0.01$) comparison with control group. This reduce in testosterone level was similar to the results of former researchers [24,25] and others. The results also revealed a significant increase for the level FSH hormone in the infertile group comparison to the control group ($P<0.05$). These results are consistent the results of former researchers[26], but they were opposing to the results of another study [27]. Most cases of male infertility are confined to sperm deficiency, semen quality [28], The hormone testosterone is the most important male hormone in men produced by LH, whose release from pituitary gland stimulates the steroidogenic leydig cells to release testosterone in the testis, testosterone perform the primary morphological development and reproductive function [29], It is also essential to the development of normal sperm. In Sertoli cells, the testosterone activates genes in order to differentiate between the spermatogonia[7,30], Perhaps the decline in the level of the hormone testosterone due to the presence of varicocele, Because varicose veins cause obstruction to the effectiveness of the enzyme 17B – hydroxysteroid dehydrogenase, Which contributes to the process of synthesis of testosterone and thus it may cause a decrease in the level of testosterone [31]. hormone FSH plays important role in the induction and maintenance of spermatogenesis. Measuring serum FSH can be a useful marker for the histological condition in the testis [32], An elevated FSH level in male may be is indicate of primary testicular failure, may be indicate of abnormalities in initial sperm production and can be indicate the presence of Klinefelter syndrome [26,33]. Therefore, when testis failure in the production of sperm and the occurrence of the cessation of testicular activity and the absence of sperm in the semen occurs high in the level hormone FSH because of the continued pituitary secretion in an attempt to stimulate the testis to produce sperm or It is due to decrease of inhibin secretion [34]. also, in the case of spermatogenic damage less production of sertoli cells to the inhibin than activing, an FSH releasing factor, or decrease in testosterone due to dysfunction Leydig cell Which causes an increase in the levels of FSH [35]. In men who suffer from testosterone inertia, they cannot maintain sperm, and if Gonadotropin is stimulated by a dose of testosterone or activated by FSH, activation of the FSH will increase the sperm count but quantitatively normal spermatogenesis was not achieved, such a disorder were found to associate with reduced in the means of semen parameters and testicular volume, So in order to achieve quantitatively normal levels of sperm production required to normal levels of both LH and FSH [36]. The results in our study, the level of the LH hormone in the infertile group, there was no significant difference compared with control group ($P > 0.05$), The results above agree with other studies conducted by [30]. Prolactin is secreted by the pituitary gland and other organ tissues, It is present in men, but he did not get yet clear role. It is a field of research [22]. Elevation of the hormone prolactin in men has a negative impact on them, It rise also causes a decline in production of testosterone, through block the secretion of gonadotropin affecting the testes function [19], There are many studies on feedback mechanisms, suggesting a typical role of prolactin in regulating male fertility [21]. Also, the high level of FSH with hyperprolactinemia indicating disturbance of spermatogenic [37] can lead to a reduction in the number of sperm with altered sperm quality Because there is a negative relationship between levels of prolactin and sperm, impaired sperm motility, loss of libido and increase too much can lead to temporary infertility and sexual dysfunction [19, 26, 38, 39], The results in our study, the prolactin level in infertile

group was significantly higher than the control group (P<0.01). Our results are in agreement with other studies conducted by [26, 40].

Conclusion

Based on the results of this study, we conclude that the disturbance in the semen parameters of the infertility group is the result of the disorder in the level of hormones (Testosterone, FSH and Prolactin) and that the therapeutic intervention to modify the level of hormones may contribute to improving the quality of sperm parameters.

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تقدير تأثير مستوى هرمونات المصل (هرمون تستوستيرون، هرمون اللوتيني, هرمون تحفيز الجريب والبرولاكتين) على معلمات السائل المنوي في عقم الرجال

محمد اسعد مهدي ، دحام لطيف شويش ، نور الدين عبد الرضا

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الملخص

يعتبر العقم حالة مرضية تعاني منها المجتمعات السكانية وان لها اسباب عدة منها اضطراب مستوى الهورمونات وتأثيره في احداث تغير بمعلمات السائل المنوي. وقد صممت هذه الدراسة لتقدير مستوى الهرمونات (التستوستيرون , الهورمون المحفز للجريبات , الهورمون الوتيني والبرولاكتين) لمجموعة العقم، والتأثير المحتمل لهذه المتغيرات الهرمونية على معلمات السائل المنوي. وقد تضمنت الدراسة (50 رجلا) تم اختيارهم كمجموعة عقم غير قادرين على الانجاب، في المقابل تم اختيار (20 رجلا) سليما وقادرين على الاخصاب واعتبارهم كمجموعة ضابطة. تم قياس مستوى هورمونات المصل (التستوستيرون, الهورمون المحفز للجريبات, الهورمون الوتيني والبرولاكتين) بجهاز Mini VIDAS بطريقة LFA (Enzyme Linked Fluorescent Assay) , وتم اجراء تحليل السائل المنوي وفقا لتوصيات منظمة الصحة العالمية. اظهرت النتائج انخفاض معنوي في مستوى هورمون التستوستيرون لمجموعة العقم (1.89 ± 0.67 ng/ml)مقارنة مع المجموعة الضابطة (p < 0.01), (4.95 ± 1.22 ng/ml). كما اظهرت مستوى هورمون المحفز للجريبات والبرولاكتين لمجموعة العقم (25.56 ± 18.56 ng/ml , 7.15 ± 7.5 m IU/ ml) على التوالي ارتفاعا معنويا مقارنة مع المجموعة الضابطة (P <0.05 , P < 0.01) ; (12.8 ± 2.51 ng/ml , 2.8 ± 0.84 m IU/ml). لم يظهر أي اختلاف معنوي في مستوى هورمون اللوتيني بين مجموعتي الدراسة. كما اظهرت الدراسة ان تركيز الحيوانات المنوية , السريعة الحركة , البطيئة الحركة والحيوانات المنوية الطبيعية التشكيل لمجموعة العقم كان اقل معنويا من المجموعة الضابطة ($P < 0.01$).

يستنتج من الدراسة ان الاضطراب الحاصل في معلمات السائل المنوي للرجال العقم ناتج عن الاضطراب الحاصل في مستوى الهورمونات الانجابية ، وان اي تعديل في مستوى الهورمونات ربما يساهم في تحسين معلمات السائل المنوي.