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THE ROLE OF ADIPONECTIN HORMONE IN THE INFERTILE MEN

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ABSTRACT
Assessment of sperm concentration as a component of semen analysis is one of the most important steps in the evaluation of infertile males. Adiponectin is a protein hormone, an important source of this hormone is from adipose tissue having influence on both metabolism and reproduction. The objective of this study is to evaluate the concentration of adiponectin hormone in serum of the infertile male and to find its role in the semen parameter. Seventy infertile male were enrolled in this study, other twenty fertile male were enrolled as a control. Semen analysis was done to all of them. Fasting blood for (10-12) hours was aspirated from that entire subject. Adiponectin, testosterone, LH, FSH concentration were measured in the serum by enzyme-linked immunosorbent assay (ELISA) technique. Mean FSH was significantly higher in patient than in control groups P= (0.023). Mean LH, Testosterone was not significantly different in patient group than in control group, P= (0.435) (0.898) respectively. Mean adiponectin hormone level was significantly higher in patients than in control group, P= (0.014).There was no significant difference in mean testosterone and adiponectin. The results showed that adiponectin concentration was elevated in patients with asthenoazoospermia, astheno-teratoazoospermia and azoospermia.

KEYWORD: male infertility, adiponectin, LH, FSH, testosterone.

INTRODUCTION

Male infertility refers to the failure of a man to achieve pregnancy in a fecund female. Formerly the problem of infertility in couples was ascribed to female alone and hence bears the bulk of the psychosocial effects. This is probably due to a cultural believe and inadequate knowledge and clear understanding. Male infertility is considered when recognizable female causes of infertility are excluded and semen quantity and quality fails to fulfill WHO criteria[1]. Known etiology of male infertility can be divided according to the affecting factor into pretesticular, testicular and post testicular factors[2].

Researchers had shown that male factors accounts for 40-50% of infertility in human[3,4] In more than 50% of male infertility cases, the etiology remains unknown, and the infertility is thus categorized as idiopathic[5]. Adiponectin is secreted from mature adipocytes in human (also from the placenta in pregnancy)into the blood stream, and it has been shown to be a significant regulator, of glucose and lipid metabolism, Adiponectin show negative influences on gonadotropin-releasing hormone (GnRH) secretion from the hypothalamus, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) secretion from the pituitary and testosterone at the testicular level[6]. The aim of this study is to evaluate the concentration of adiponectin hormone in serum of infertile male and to find its role on their semen parameter.

MATERIALS & METHODS

Seventy infertile male (patients group) and twenty fertile male (control group) were enrolled in this study at High Institute of Infertility Diagnosis and Assisted Reproductive Technology, Al- Nahrin University, Baghdad, Iraq. Semen analysis was done to all of them. Ejaculates were obtained in the morning (9.00 hours and 11.00 hours) after (3-5) days of sexual abstinence. The samples were examined immediately after liquefaction according to WHO guidelines. Fasting blood for (10-12) hours was aspirated from that entire subject the blood was allowed to clot at room temperature. The serum was separated after centrifugation and stored at -20°C until time of assay. Adiponectin, testosterone, LH, FSH concentration were measured in the serum by enzyme-linked immunosorbent assay (ELISA) technique.

Statistical analysis

Data were summarized, presented and analyzed using Statistical Package for Social Sciences (SPSS) software program version 16. Microsoft Office Excel software program was used to present data in form of figures. Mann Whitney U test was used to compare median adiponectin difference between patient group and control group, P-value of ≤0.05 was considered significant.

RESULTS

Mean FSH was significantly higher in patient group than in control group, (7.06±1.02) versus (2.61±0.30), and P-value was 0.023.Mean LH was not significantly different in patient group than in control group, (8.93±1.08) versus (7.33±0.53), and P-value was 0.435.Mean Testosterone was not significantly different in patient group than in control group, (6.26±0.33) versus (6.17±0.56), and P-value was 0.898.

TABLE 1: Mean serum hormone levels in patients and control group

Hormone	Groups	Mean	SE	Minimum	Maximum	P-value
FSH (IU/L)	Control	2.61	0.30	0.77	5.21	0.023
	Patients	7.06	1.02	0.17	42.07	
	Total	6.07	0.82	0.17	42.07	
LH (IU/L)	Control	7.33	0.53	2.33	11.61	0.435
	Patients	8.93	1.08	0.62	60.71	
	Total	8.58	0.85	0.62	60.71	
Testosterone (ng/ml)	Control	6.17	0.56	2.74	10.99	0.898
	Patients	6.26	0.33	0.78	15.50	
	Total	6.24	0.28	0.78	15.50	

TABLE 2: shows the mean adiponectin hormone level was significantly higher in patients than in control group, 63.38±2.58)versus(48.98±4.94), and P-value was 0.01

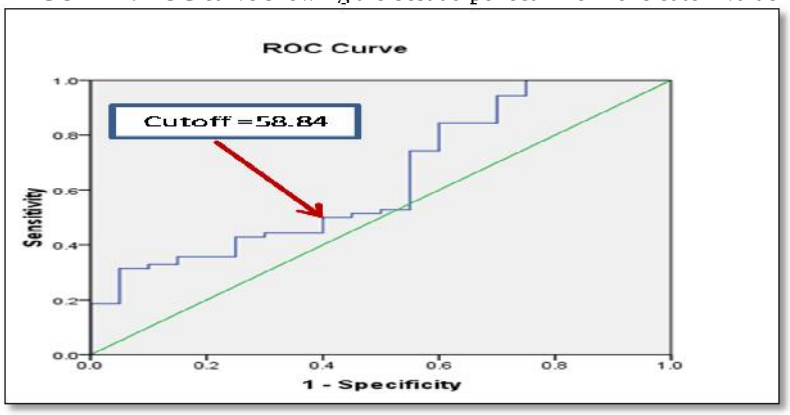
TABLE 2: Comparison of mean and median adiponectin level between patients group and control group

Groups	Median	Mean	SE	Minimum	Maximum	P-value
Control	56.92	48.98	4.94	13.92	83.99	
Patients	58.34	63.38	2.58	27.59	118.13	0.010
Total	57.38	60.18	2.36	13.92	118.13	

TABLE 3: Association between sperm activity and hormone levels

Hormone	Oilgoastheonterato zoospermia (n=33)		Asthenoterato zoospermia (n=18)		Azoospermia (n=11)		Astheno zoospermia (n=5)		Oligo zoospermia (n=3)		P-value
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
FSH (IU/L)	5.62	1.13	3.12	0.46	18.58	3.65	2.11	0.51	12.38	4.81	0.001
LH(IU/L)	8.39	1.28	6.17	0.87	15.18	4.90	4.54	1.00	15.97	5.36	0.018
Testosterone (ng/ml)	6.06	0.40	5.39	0.38	6.47	1.12	6.98	1.41	11.71	2.12	0.093
Adiponectin (ng/ml)	58.66	3.27	63.56	5.55	74.11	8.14	69.73	9.54	64.22	0.64	0.489

FIGURE 4: ROC curve showing the best adiponectin hormone cutoff value



This test showed that the cutoff value of was ≥ **58.84** which can predict positive diagnosis, but unfortunately it has a poor accuracy.

DISCUSSION

In the current study, mean adiponectin hormone level was significantly higher in patients than in control group in patient group there was no a significant correlation between adiponectin hormonal and LH, FSH and testosterone. And also no a significant correlation with LH, FSH, and testosterone in the control group accordance with earlier studies[6]. Surprisingly, facts show negative influences of adiponectin on GnRH secretion from the hypothalamus, LH and FSH secretion from the pituitary and testosterone at the testicular level. Thus far, the adiponectin in the influence of metabolism on reproduction in men is limited[7]. The actions of adiponectin hormone on the hypothalamus and pituitary, the hypothalamic/pituitary/gonadal axis is central to the mammalian reproductive system[8]. Pulsatile secretion of gonadotropin-releasing hormone (GnRH) by hypothalamic neurons stimulates the release of pituitary gonadotropins, LH and follicle-stimulating hormone, regulating testicular steroidogenesis and spermatogenesis, respectively[9-11]. In the present study, mean serum adiponectin levels in patient group (azoospermia, asthenoteratoazoopermia) was elevated, this impact disagreement with Kasimanickam V.R. study[12]. Adiponectin and its receptors play a major role in sperm morphology and function, contributing to increased fertility in bull. This result was in agreement with Luc J. Martin[6]. Results from hypothalamic and pituitary cell lines recommend that adiponectin may have

inhibitory actions on hypothalamic and pituitary secretions of GnRH and LH[13]. hbIn the present study, elevated mean serum levels of LH were observed in males patient group (azoospermia, oligazoopermia), when compared with the levels in control group (normozoospermic men), these results are accordance with earlier studies of Anderson RA and DeKretser DM[14,15] which showed gonadotrophic raise in infertile males. In several studies elevated levels of LH in azoospermic and oligozoospermic males, when compared to normal fertile men, were also documented [16,17] which is an agreement with this study. The mean serum level of FSH was significantly higher in patient group than in control, this was agreed with Gordetsky[18]. FSH level showed statistically significant relations, as well as sign of a dose response, with abnormal sperm morphology and concentration. The mean serum testosterone levels in patient group (azoospermia, oligazoopermia, asthenoazoopermia , asthenotertospermia, oligasthenteratoazoospermia), and control group men was not significantly difference, Similar observation has been noted in earlier studies [19,20] which have reported normal level of testosterone in infertile men with Sertoli cell syndrome, when compared with control group, but in contrast to alternative study, where decreased level of testosterone was observed in infertile males [21].

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