ISSN: 13412051
Volume 25, Issue 04, April, 2020

Seminal Biochemical Markers and Serum Fertility Hormones in Men with or without Infertility/Basrah-Iraq

Adnan Jassim Mohammed Al-Fartosy[1*], Hadi Z. Al-Sawaad[2], Idrees H. Abogale Al-khazali[3]

Department of Chemistry, College of Science, University of Basrah, Basrah, Iraq[1,2,3]

Corresponding author: 1*

ABSTRACT— We aimed to evaluate the seminal biochemical markers and serum fertility hormones in men with or without infertility in province of Basrah-Iraq. From 113 men volunteers, 57 were with primary and 56 had secondary infertility, while 50 fertile men were taken as controls. Their fasting BMI, serum, LH, FSH, PRL, Ts, seminal fluid resistin, NAG, and total protein were determined by ELISA methods. Seminal fluid citric Acid, fructose and ACP were measured by standard colorimetric methods. Compared with normal controls, the results indicated that patient's men with 1o IM and 2o IM had significantly higher levels of FSH ($p<0.01$), LH ($p<0.05$), PRL ($p<0.01$), resistin ($p<0.05$), ACP ($p<0.01$), and fructose ($p<0.01$), and significantly decreases in Ts ($p<0.01$), NAG ($p<0.01$) and CA ($p<0.01$) and total protein ($p<0.05$), while BMI levels were not significantly different ($p>0.05$). In conclusion, the findings further demonstrated that determination of serum reproductive hormones and seminal fluid biochemical parameters may give a useful information for clinical studies in the status of men infertility as well as can be used as a biomarker for detection of early-stage of infertility and treatment success of men fertility disorders.

KEYWORDS: Semen analysis, Reproductive hormones, Men infertility, Demographic trends.

1. INTRODUCTION

Infertility is defined as inability of couples to achieve pregnancy following one year of unprotected intercourse. By this criterion, infertility affects 13%–18% of couples and male factors account for up to half of all cases [1]. Semen analysis is routinely used to evaluate the male partner in infertile couples and provides useful information for diagnosing male infertility. Each of the sperm measurements helps to distinguish between fertile and infertile men however none is a powerful discriminator [2]. Semen or ejaculate is the fluid discharged from the penis during the time of orgasm. Like blood, semen consists of two compartments, cellular compartment (spermatozoa), and noncellular compartment (seminal plasma). Thus, it contains the sperm, which sometimes results in pregnancy following vaginal sex with a female. Semen is a whitish, milky fluid, slightly viscous, containing water and small amounts of salt, protein, fructose, citric acid and other substances. Spermatozoa make up only about 5 to 10% of the volume of semen. The bulk of the seminal plasma, the fluid portion of semen, is contributed by the male accessory organs of reproduction. In male infertile patient's semen analysis reveals a decreased number of spermatozoa (oligozoospermia), decreased motility (asthenozoospermia) and many abnormal forms on morphological examination (teratozoospermia). These abnormalities usually occur together and are described as the oligoasthenoteratozoospermia [3]. The epididymis synthesizes certain compounds that are secreted in the semen. These include total protein, adipokines, carnitine, lipid, glycerylphosphorylcholine, neutral-α-glucosidase, carbohydrates, acid phosphatase, citric acid, steroids and other small molecules [4]. Also, biochemical evaluation of seminal fluids suffering from infertility provided some evidence on reduced fertility of their gametes. Any change in the biochemical composition of semen, such as reduced fructose

levels, was known to cause a reduction in sperm motility [5]. Although the scientific community has started resolving the secrets of the close linkage between infertility and its causes, a lot is still remaining to be discovered. Therefore, present study is focused on the objective of assessing the seminal biochemical markers and serum fertility hormones in men with or without infertility in province of Basrah-Iraq.

2. Patients and Methods

2.1. Subjects

The present study is an interventional prospective randomized controlled clinical trial. Samples were collected from the "infertility center" at Basra hospital for Obstetrics and children in Basrah Governorate-Iraq during the period from January 2019 till end of September 2019. In addition to patients' samples obtained from a private clinic run by consultant professor Dr. Abdul-Kareem Hussain Sabar in Obstetrics and Infertility medicine. In this prospective clinical study, 225 men volunteers aged between 20 to 60 years participated in the present study. One hundred and thirteen volunteers of patients and 50 healthy controls were followed up for 8 months, to end the study. While 62 of men volunteers (39 patients and 23 healthy controls) were excluded from the study due to enable to follow up study. The patients are already diagnosed as infertile men according to the criteria from the American College of Obstetricians and Gynecologists [6]. From 113 men that were screened for inclusion in the study, 57 were with primary infertility (couple who had no previous pregnancies for at least one year after marriage) and 56 had secondary infertility (couple who have conceived previously, although the pregnancy may not have been successful for example, miscarriage, and ectopic pregnancy) while 50 fertile men attending the hospital with a genital prolapsed and history of at least one childbirth were taken as controls. The sample populations are married men who live together with her wife and have not used any contraceptive method for one year, but they are still childless. The controls were volunteers who freely agreed to participate in the study. Consent for the study was obtained from all enrolled patients. Demographical data were collected via a structural interview that was conducted during the first visit. A basic medical, surgical, reproductive and family history was recorded. All patients submitted a semen specimen and a blood sample.

2.1.1. Inclusion Criteria

The subjects were men attending the fertility clinics that complained of inability to achieve pregnancy for at least one year after marriage (with no apparent chronic or acute disease), and whom their wives had shown no diagnosed causes of infertility (hormone test, laparoscopy). The partners of fertile men had to be pregnant or to have delivered a child within the previous two years.

2.1.2. Exclusion Criteria

The exclusion criteria included a history of smoking habit, alcohol consumption, and occupational chemical exposure; history of major renal, hepatic and diabetes disorders and myopathy; treatment with other drugs within the 3 months before enrolment in this study; history or presence of primary testicular disease (cryptorchidism, orchitis, varicocele) or testicular volume ≤ 12ml; infected semen; elevated (>10 mIU/ml) serum FSH concentrations or other abnormal hormonal assay; and abnormal sonography.

2.2. Samples

All samples were obtained in the morning between 09:00 and 10:00 hours after a 12-h fast and a 30-min of rest in the supine position.

2.2.1. Blood samples

A single blood sample (5 mL) was collected from each patient. The blood samples were placed in gel tubes were allowed to clot. After the blood had clotted it was placed in a centrifuge and spun at 402 Xg for 10 minutes to obtain the serum. The serum was immediately used in the detection of variables in this study, and others were stored in deep freezing at (-20ºC) until using.

2.2.2. Seminal fluid samples

All samples were collected in a separate room near to the laboratory, using masturbation without lubricant. The seminal fluid samples were collected after a minimum of 2 days and a maximum of 7 days of sexual abstinence. The samples were obtained by masturbation and ejaculated into a clean, wide-mouthed container made of glass or plastic, from a batch that has been confirmed to be non-toxic for spermatozoa. Samples were delivered to the laboratory within an average of 10 minutes and placed immediately in an incubator and allowed to fully liquefy.

2.3. Methods of Biochemical Estimation

The body mass index (BMI) of subjects was calculated as the following formula: BMI (kg/m2) = weight (kg)/height (m2) [7]. All the blood and seminal fluid samples were analyzed for biochemical parameters by standard procedures. Serum luteinizing hormone (LH) was estimated by Kit (Catalogue No. REF-53010, Human Gesellschaft for Biochemical and Diagnostic mbH, Germany), FSH was estimated by Kit (Catalogue No.REF-53020, Human Gesellschaft for Biochemical and Diagnostic mbH), prolactin (PRL) was estimated by Kit (Catalogue No. REF-53030, Human Gesellschaft for Biochemical and Diagnostic mbH) and testosterone (Ts) was esti¬mated by kit (KA0236, Abnova, Tai¬pei, Taiwan). Also, seminal fluid resistin level was determined using the Kit (Catalogue No. E-ELH1213, Ealbscience, Texas, USA), Human Neutral-α-Glucosidase ELISA (NAG) was estimated by Kit (Catalogue No. E-EL-H0980, Ealbscience), total protein was estimated by Kit (Catalogue No. E-BC-K318, Ealbscience), citric Acid (CA) was estimated by Kit (Catalogue No. E-BC-K351, Ealbscience), fructose was estimated by Kit (Catalogue No. E-BC-K134, Ealbscience), acid Phosphatase (ACP) was estimated by Kit (Catalogue No. E-BC-K094, Ealbscience).

2.4. Ethical issues

The study obtained an ethical approval from college of science in Basrah University (7/54/1169), and an informed consent was gotten from each participant after clarification of the procedures in full details. The informed agreement and ethical guidelines were obeyed according to the Declaration of Helsinki for year 2000.

2.5. Statistical Analysis

For statistical analysis, results are analyzed by employing the SPSS software (Version 22) and the values were described as “mean ± standard deviation (SD). Pearson’s correlation analysis was executed. All comparisons were 2-tailed and counted highly statistically significant when ($p<0.01$), statistically significant when ($p<0.05$) and statistically non-significant when ($p>0.05$).

3. Results

The general characteristics of all subjects participated in the present study were presented in in Table 1.

Table 1. The demographic characteristics of the present study.

The Characteristics	Control	Infertile Men (IM)

			Primary (1º IM)	Secondary (2º IM)
Total (No.)		50	113	
			57	56
Age (mean ± SD)		27.3 ± 3.8	29.8± 7.2	36.6 ± 9.3
BMI (Kg/m^2)		22.5 ± 0.9	22.4 ± 1.1	22.6 ± 1.4
Smoking habit	Negative	6	5	6
	Positive	44	52	50
Demographic area	Urban	45	54	55
	Rural	5	3	1
Education	Learned	47	56	54
	Illiterate	3	1	2
Employment	Employed	49	55	55
	Not Employed	1	2	1
Drinking Alcohol	Negative	46	54	51
	positive	4	3	5
Vegetarian	Negative	42	47	44
	Positive	8	10	12

Values are presented as number or mean ± SD. IM, Infertile Men; BMI, body mass index.

Clinical examination and laboratory investigations revealed that 15% of infertile patients had azoospermia, 30.9% had Oligozoospermia, 39.8% had Asthenozoospermia, 10.6% had Teratozoospermia and 3.5% of the infertile patients had sexual dysfunction, as illustrated in Table 2.

Table 2. Distribution of sperm abnormalities in infertile patients.

Sperm abnormality	Total Subjects 113	Primary (1º IM) 57	Secondary (2º IM) 56
Azoospermia	17 (15.0)	9 (15.7%)	8 (14.2%)
Oligozoospermia	35 (30.9)	17 (29.8%)	18 (32.1%)
Asthenozoospermia	45 (39.8)	23(40.3%)	22 (39.2 %)
Teratozoospermia	12 (10.6)	7 (12.2%)	5 (8.9 %)
Sexual dysfunction	4 (3.5)	1(1.7 %)	3 (5.3 %)

Compared with normal controls, the results indicated that patient's men with 1o IM and 2o IM had significantly increased levels of FSH ($p<0.01$), LH ($p<0.05$), PRL ($p<0.01$) and significantly decreased in Ts ($p<0.01$), while BMI levels were not significantly different ($p>0.05$), as illustrated in Table 3.

Table 3. Levels of BMI and serum hormones in infertile patients and control group. The values are the

Mean ± SD

Parameters		Infertile Men (IM) 113					Control 50
		Mean ± SD	SE	Range	95 % C. I		Mean ± SD
					Lower	Upper	
BMI (Kg/m^2)	Primary (1º IM)	22.6 ± 1.1	0.01	20.9 – 24.9	22.1	22.0	22.5 ± 0.99
	Secondary (2º IM)	22.7 ± 1.3	0.02	21.0 – 25.0	22.9	23.3	
Ts (ng/mL)	Primary (1º IM)	2.29 ± 0.8**	0.01	0.8 – 4.2	0.07	4.51	4.02 ± 0.5
	Secondary (2º IM)	2.70 ± 1.3**	0.02	0.8 – 13.2	0.05	6.3	
FSH (mU/mL)	Primary (1º IM)	6.6 ± 1.6**	0.02	4.0 – 15.0	2.2	11.0	4.4 ± 0.8
	Secondary (2º IM)	6.4 ± 1.5**	0.02	2.4 – 8.9	2.3	10.5	
LH (mU/mL)	Primary (1º IM)	4.8 ± 1.4*	0.02	0.4 – 12.5	1.0	8.6	3.9 ± 0.3
	Secondary (2º IM)	4.7 ± 1.2*	0.02	0.65 – 10.9	1.4	8.0	
PRL (mU/mL)	Primary (1º IM)	8.1 ± 1.6**	0.02	3.1 – 17.3	3.7	12.5	5.2 ± 1.4
	Secondary (2º IM)	7.5 ± 1.7**	0.03	3.3 – 15.7	2.7	12.2	

Data are presented as mean ± SD, SE: Standard Errors; n: Number of the subjects; Range: is the difference between the highest and lowest values in the set; 95% C.I: Confidence limits (Lower and Upper); p-value: N.S ($p > 0.05$), S ($p < 0.05$), HS ($p< 0.01$) indicate the level of significance in comparison with the corresponding control value. Data obtained in (Table 4) revealed that there were a significantly higher levels of resistin ($p<0.05$), ACP ($p<0.01$), and fructose ($p<0.01$), and significantly decreases in the level of total protein ($p<0.05$), NAG ($p<0.01$) and CA ($p<0.01$), respectively in infertile patients (1o IM and 2o IM) with compared to control groups.

Table 4. Levels of seminal biochemical markers in infertile patients and control group. The values are the Mean ± SD

Seminal biochemical marker		Infertile Men (IM) 113					Control 50
		Mean ± SD	SE	Range	95 % C.I.		Mean ± SD
					Lower	Upper	
Resistin (pg/mL)	Primary (1º IM)	2015.5 ± 97.0*	12.8	1256 – 4099	1746.3	2042.0	1778.8 ± 90.0
	Secondary (2º IM)	2305.3 ± 95.0*	12.7	43.0 – 4496	2284.7	2568.0	
NAG (ng/mL)	Primary (1º IM)	4.2 ± 1.6**	0.2	1.75 – 10.0	0.2	0.3	6.2 ± 1.2
	Secondary (2º IM)	4.7 ± 1.8**	0.2	2.0 – 11.0	8.6	9.6	
CA (µmol/L)	Primary (1º IM)	3.10 ± 1.3**	0.3	1.25 – 8.0	2.4	2.3	4.5 ± 1.2
	Secondary (2º IM)	3.17 ± 1.6**	0.4	1.7 – 9.0	3.7	4.0	
ACP	Primary (1º IM	57.7 ± 1.1**	0.01	39.3 – 90.01	3.7	4.0	30.4 ± 0.9

(U/100mL)	Secondary (2º IM)	53.8 ± 1.3**	0.01	32.4 – 78.0	54.7	50.2	
TP (µg/mL)	Primary (1º IM)	762.0 ± 35.0	0.6	550.0 – 1100.0	664.9	690.2	802.6 ± 40.0
	Secondary (2º IM)	765.2 ± 38.0	0.6	220.0 – 980.0	859.1	900.6	
Fructose (mg/mL)	Primary (1º IM)	3.0 ± 1.3**	0.02	0.3 – 4.9	0.6	2.6	1.8 ± 0.62
	Secondary (2º IM)	2.9 ± 2.0**	0.03	0.3 – 9.0	6.6	8.4	

Data are presented as mean ± SD, SE: Standard Errors; n: Number of the subjects; Range: is the difference between the highest and lowest values in the set; 95% C.I: Confidence limits (Lower and Upper); p-value: N.S ($p > 0.05$), S ($p < 0.05$), HS ($p< 0.01$) indicate the level of significance in comparison with the corresponding control value.

4. Discussion

To the best of our knowledge, this is the first study climbed on the objective of assessing the effect of IR on serum OPG and some trace elements levels in diabetic patients with and without nephropathy in Basrah province (southern of Iraq). In the present study, data showed that most patients with infertility (primary and secondary) were smokers. There are some recent studies reported that smoking has hazardous effects on lifestyle for both active and passive smokers. Also, these studies were directed to illustrate that tobacco cigarette smoke able to creating a carcinogen in many organs of the human body like lungs and urinary bladder, as well as their effects on fertility status throughout adverse influence on the semen quality [8]. Moreover, the same (Table 3.1) showed that most of the volunteers from the men with infertility and healthy control of both patients were from the Basrah province. Therefore, our results cannot represent the actual state of the entire patient's group in Iraq due to the low number of patients and also depends on the cooperatively of patients and they are willing to participate in the present study. The major differences between urban and rural areas are the differences in pollution, environments, social, psychological, genetic, food factors and others, which are increasing dramatically in urban areas [9]. Furthermore, our data was, revealed that most of the patient's men with infertile men were nonvegetarian and not-drinking the alcohol. Moreover, the sperm abnormalities of all men patients with infertility participated in the present study are illustrated in (Table 3.2). Our results indicated that the level of FSH hormone was highly significantly increased in blood serum of infertility men (both primary and secondary) which are considered to be a reliable indicator of germinal epithelial damage, and was shown to be associated with Azoospermia and severe oligozoospermia. Also, testicular size is common in patients with azoospermia or oligospermia and is represented as a common marker [10]. Furthermore, the following reasons may give a possible explanation for these observations in levels of FSH hormone in serum of infertility men; first, is increased concentrations of FSH cannot be explained exclusively by a decreased inhibin or testosterone. Other (unknown) factors are probably involved. Secondly, an elevated FSH concentration does not always indicate a damaged germinal epithelium but may also reflect a compensatory adaptation to partial destruction or removal of testicular parenchyme, resulting in (sub) normal sperm production. Finally, testicular biopsies could be useful even in case of azoospermia with high FSH concentrations because if spermatozoa are found, they could be used for intracytoplasmic sperm injection (ICSI) [11].

The decreased testosterone level is likely due to a combination of certain factors including increased aromatase enzyme activity which converts testosterone into estradiol. Also, age-related oxidative damage to the testis and Leydig cells, resulting in decreased production of testosterone. Leydig cells are interstitial cells that are interspersed between the seminiferous tubules of the testis. They secrete androgen in response

to stimulation by luteinizing hormone (LH) from the anterior pituitary gland. Furthermore, declining levels of precursor molecules, such as dehydroepiandrosterone (DHEA), which is may produce by the adrenal glands and is the precursor of the sex hormones estradiol and testosterone. Moreover, decreased sex hormone-binding globulin (SHBG) production, the major carrier protein of testosterone in circulation [12]. Testosterone biosynthesis is regulated primarily by pulsatile secretion of luteinizing hormone (LH) and serum testosterone levels reflect the integrity of the hypothalamic-pituitary-gonadal (HPG) axis. Therefore, low testosterone levels noted may indicate a defect at one or more functional levels of the HPG axis. In this state, Leydig cell function, particularly steroidogenesis, may be impaired by changes in the production of hormones and cytokines locally in the target tissue and adipose tissue [13]. Moreover, low testosterone's indirect effect on fertility involves a reduced sex drive that can result in a lack of desire to even have sex. It can also cause erectile dysfunction by causing a man to have fewer erections or erections that aren't as strong as they once were. On the other hand, a decreased level of testosterone hormone can make it difficult to reach climax or to have sex often enough for reproduction. Also, it is responsible for normal growth, development of male sex organs, and maintenance of secondary sex characteristics. A high intratesticular level of T is an absolute prerequisite for sperm production, and function. Additional studies are needed to fully delineate the biochemical and physiological mechanisms underlying reduced testosterone synthesis in infertility men [14]. LH is one of the three main gonadotrophin hormones which are important for human reproduction. The primary role in the male is to stimulate testosterone production by the Leydig cells, which then, together with FSH, control the development of spermatogonial cells and spermatogenesis in the test Sertoli cells. Gonadal failure, a cause of infertility is demonstrated by elevated LH and FSH rates, and low gonadal steroid levels. A failure of hypergonadotrophic hypogonadism, seminiferous tubule dysgenesis (Klinefelter syndrome), Sertoli cell failure, and anorchia may result in elevated LH levels in men. For sexually mature adults, gonadotropin deficiency is observed with low levels of LH, FSH, and steroids. Through the action of Leydig cells, LH controls men's sexual differentiation, pubertal androgenization, male sexual function, and fertility. Anomalies or deficiencies in the LH would thus interfere with the regulatory role of Leydig cells and lead to men becoming infertile [15]. In some scientific reports, it was reported that in several patients with oligozoospermia and azoospermia there is not only impaired spermatogenesis but also impaired function of Leydig cells. The levels of LH hormone are many times higher in seminal plasma than in serum, which has been substantially elevated in oligozoospermia and normozoospermia relative to azoospermia. The enhancement of sperm fructolysis by LH and adenyl cyclase activity, which are important ways in which sperm obtain energy for their motility, suggests a potential role for seminal plasma LH in sperm motility and metabolism. Recently, molecular variants of LH were identified and found to be associated with infertility in men. The results showed that LH levels increased and T levels decreased, an inverse relationship between LH and T may result from a primary Leydig cell abnormality with a steroidogenesis deficiency, or a hypothetical signal alteration between the seminiferous tubule and the Leydig cell compartments of the testis. Speculation that LH is elevated due to decreased steroid input from Leydig's primary or acquired cell steroidogenesis defects is confirmed by finding reduced T responses to hCG in men with primary seminiferous tubular failure. Also, azoospermia and oligozoospermia e were observed in male patients with elevated mean serum levels of LH [16].

Higher prolactin hormone levels can be attributed to medical or pathological factors, as well as stress and exercise can also contribute to small increases in prolactin levels and are important causes of physiological hyperprolactinemia. Also, hypothalamic dopamine (DA) prevents prolactin secretion; thus compression of the pituitary stalk by a non-prolactin-secreting pituitary tumor or other parasellar mass may result in hyperprolactinemia. On the other hand, it can be triggered or associated with several pathogenic levels, such as pituitary adenoma, hypothalamic disorders, hypogonadism and hypothyroidism, and some other causes in

patients' men with infertility [17]. Also, chronic hyperprolactinemia is known to reduce testosterone production and is well known to decrease libido, cause oligozoospermia and contribute to fertility among men. Furthermore, the higher level of prolactin in the blood serum may have a detrimental effect on the reproduction of men via inhibiting the pulsatile release of gonadotrophins from the anterior hypophyseal gland and directly affecting spermatogenesis [18]. Increased levels of resistin in seminal plasma, although the patients were non-obese and had no overweight may be due to that most of the infertility men participating in this work, were tobacco smokers. In cases of smoking, levels of resistin hormone are increased in seminal plasma, suggesting that resistin may play a vital regulatory role in the inflammation of the men's reproduction system as well as may act as an endocrine mediator and linking energy [19]. Furthermore, it is closely related to the pathway of cytokine proinflammatory, has an effects on many human cells as well as enhancing inflammatory and autoimmune processes. Inflammation status may lead to increases in the levels of cytokines and ROS, and this may have a deleterious effect on the reproductive function of men and inflammatory cytokines reduce testosterone production by activating TLR2 receptors on LC. On the other hand, scientific reports were illustrated that an increase in ROS could induce a decrease in spermatic concentration, motility, and sperm count. Moreover, there are some recent studies reported that level of resistin in seminal fluids was significantly increased in cases of leukocytospermia or if the patients were smokers [20]. The present results indicated that the lower levels of NAG activity in seminal plasma may occur in patients of primary and secondary infertility men which have a testicular origin, possibly due to a direct effect of the testis on the epididymis. Also, an impaired in the function of sertoli cells maybe result in both decreased secretion of a binding protein for testosterone and maturation arrest in spermatogenesis. There are several substances secreted into the epididymal fluid have been identified as modulators of epididymal maturation, including the enzyme neutral α-glucosidase [21]. The physiological roles of NAG are not known precisely but, based on its ability to hydrolyze glucosidic linkages, NAG is probably involved in degradation/modification of epididymal fluid and/or spermatozoa glycoconjugates, thereby participating in the plasma membrane remodeling associated with sperm maturation. Concordantly, this enzyme has been associated with the acquisition of fertilizing ability in the epididymis [22]. In some scientific reports, it had been illustrated that despite the known androgen dependency of epididymal NAG synthesis, the total abolition of enzyme activity is achieved only when plasma testosterone is eliminated. This suggests a low threshold of androgen requirement for glucosidase synthesis and secretion. Moreover, seminal plasma of azoospermic males with bilateral obstruction between the epididymis and the ejaculatory duct contains very low α-glucosidase. In contrast, enzyme activity is normal when azoospermia results from sperm maturation arrest, an obstruction located between the epididymis and the rete testis, or in the rete testis. Hence, NAG assessment in seminal plasma of normally virilized men with azoospermia allows differentiation between the major causes of this condition [23].

The significantly decreased levels of citric acid in seminal plasma might be due to the dysfunction of the prostatic gland. It is considered a reliable measure of prostatic gland function, as well as it has a vital part in regulating the osmotic equilibrium of semen which will affect spermatozoa's membrane function and morphology and likewise, it was observed that citric acid decreased in azoospermia and extreme oligozoospermia. Therefore, citric acid may serve as a gelling agent and assists in semen liquefaction and it indirectly supports sperm motility [24]. Therefore, the decrease in the level of seminal citric acid has a direct effect on the effectiveness of the men reproductive system by controlling the value PH as well as the viscosity of semen through the process of clotting and liquefying the fluid and detecting the presence of pathological problems in the prostate gland [25]. The determination of biochemical markers in seminal plasma could be used to evaluate the functions of men accessory sex glands, which may contribute to investigating the cause and mechanism of men infertility. ACP in semen was mainly synthesized and

secreted by the prostate, which was regulated by androgens. The determination of ACP in semen has been used for forensic identification. Also, the seminal plasma ACP enzyme may be used as a biochemical marker for the origin of the semen. It may be playing a major role in spermatozoa metabolism, its structure, and its transportation. On the other hand, it is one of the richest proteins secreted by the prostate and it could catalyze the degradation of lysophosphatidic acid, which may contribute to inhibiting the progression of the prostate and could perform immunosuppressive function [26]. Hence, determining the activity of ACP in seminal plasma was considered as one common method for evaluating the prostate function. Furthermore, when the prostate suffered from the inflammation, the level of ACP in seminal plasma would increase [27]. Sperm acquires the enzyme after the enabling process (sperm differentiation) and during fertilization, the enzyme is located around the semen's head during the penetration process of the egg's outer layer and this enzyme has a gelatin property and since the outer layer of the egg is gelatinized, the ACP can adhere the sperm to the outer layer of the egg [28]. The decrease in the level of seminal total proteins may be due to the absence of vesicular proteins with higher isoelectric pH which was clearly shown in azoospermic states compared to oligozoospermia and other types of infirmity in men. As well the seminal vesicle and prostate to her attached glands were various forms of proteins that protect sperm from free radicals by intercepting specific roots that prevent sperm destruction and cell formation from it [29]. The fertility in humans is characterized by the quality parameters of the ejaculate and the fertilization process consists of several events that all must occur efficiently to achieve successful conception. Hence, defective sperms can affect any of these events leading to reduced fertility. Men fertility depends on series of factors that range from physical behavior and physical conditions to features that are linked directly to the semen such as sperm motility, levels of specific spermatic membrane proteins and biochemical constituents of the seminal plasma [30]. Increased the level of fructose in seminal fluids of infertility men (both primary and secondary groups) may be due either to shortened sperm count, irregular sperm morphology, and reduced sperm activity or seminal vesicle inflammation low levels of testosterone secretion as well as anatomical anomalies [31]. In the cases of azoospermia and severe oliogozoospermia the level of fructose in seminal plasma, there were higher when compared with norrmozoopermia, this elevated may be a decrease in sperm concentration is often accompanied by an increase in seminal plasma fructose concentration because the sperm using fructose as the primary energy source, hence decreased sperm concentration may be resulting in reduced fructose use [32]. Fructose is essential for spermatozoa metabolism and spermatozoa motility as well as it's used as an energy source for spermatozoa. It is produced by the seminal vesicles with some contribution from the ampulla of the ductus deferens. Also, it is the major glycolysable substrate of seminal plasma and is widely accepted as a marker of seminal vesicle function [14]. Therefore, the process of inflammation may lead to atrophy of the seminal vesicles and low seminal fructose concentration. When ejaculatory ducts are blocked, fructose concentration in seminal plasma usually decreases and may become undetectable. Moreover, seminal plasma fructose level determination is useful for auxiliary diagnosis of obstructive and nonobstructive azoospermia. Therefore, Determination of seminal fructose level has been used in examination of obstructive azoospermia and inflammation of men accessory glands [23].

5. Conclusion

From this study it is concluded that determination of serum reproductive hormones and seminal fluid biochemical parameters may give a useful information for clinical studies in the status of men infertility. However, further studies using larger sample sizes should be performed to establish the diagnostic value of other biomarkers for detection of early-stage of infertility and treatment success of men fertility disorders.

6. Acknowledgment

This research project was supported by the Ministry of Higher Education and Scientific Researches,

University of Basrah, College of science, Department of chemistry, as a part of master graduation program requirements. The authors thank all the staff of "infertility center" at Basra hospital for Obstetrics and children in Basrah Governorate-Iraq, especially the consultant professor Dr. Abdul-kareem Hussain Sabar.

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