

Clinical Patterns and Major Causes of Male Infertility In Fallujah City

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Abstract:

Background: Infertility is one of a major public health problem, affecting 15% of couples who attempt pregnancy; in 50% of them, the male partner is responsible. Both environmental and genetic factors, combined or separated, have been suggested as indefinable causes of infertility. Idiopathic infertility represents 15-20% of all cases.

Aim of the study: To determine the clinical patterns and to review the etiologies of infertility among men in Fallujah city and its periphery.

Patients and method: Between the beginning of January 2006 to the end of December 2010, 1410 infertile men from Fallujah city were enrolled in this study. All patients were evaluated by history and physical examinations to show the testicular size, varicocele of spermatic cord, vas deferens abnormalities and secondary sexual characteristics. Investigations including seminal fluid analysis (after three days abstinence and not >7 days) were done to all patients, and assessed according to WHO criteria, while hormonal study was indicated only to those patients with severe oligospermia.

Results: One thousand eighteen patients (72.2%) had primary infertility while 392 (27.8%) had secondary type. Patients with infertility of less than five years were considered in this study, which accounts 1222 patients only. Of those 1222 patients 878 (71.8%) had primary type and 344 (28.2%) had secondary type of infertility. Sperm count was categorized as (zero, < five millions , 5-10 million, > 10 – 19 million and ≥ 20 million). For all 1222 patients the distribution was 126 (10.3%), 78 (7.1%), 65 (5.3%), 72 (5.9%) and 872 (71.4%) respectively. Among those with primary infertility the sperm count distribution was 112 (12.8%) , 71 (8.1%) , 51 (5.8%) , 57 (6.5%) and 587 (66.9%) respectively ,while those with secondary infertility the distribution was 14 (4.1%) , 16 (4.7%) , 14 (4.1%) , 15 (4.4%) and 285 (82.8%) respectively. The sperm motility in 854 (70%) was lower than normal (asthenospermia), among them, those with primary infertility the motility was low in 620 (70.6%) while those with secondary type 234 (68%) had low motility.

Six hundreds thirty eight patients (53.2%) have identifiable causes for their infertility (history of trauma , inguinal operations ,mumps, smoking ,varicocele ,STD ,chemotherapy , chronic medical illness , radiotherapy ,and renal transplant), while 584 patients (47.8%) have non-identifiable causes of infertility. The mean of their age is 30.79 years ± 7.09 SD and their duration of infertility between 1-5 years, with mean of 2.28 ± 1.23 SD. Among those patients with non-identifiable infertility, 410 patients (70.2%) had primary infertility and 174 patients (29.8%) had secondary type.

Conclusion: Non-identifiable infertility is high among infertile men in Fallujah city compared to the results of other neighboring countries and previous Iraqi studies. These results may be in a way or another related to military pollution occurred in Fallujah city during 2004 that herald the need of further investigations.

Keywords: Infertility, Fallujah, military pollution

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Introduction

Infertility, defined as the inability to conceive after at least 1 year of unprotected intercourse, affects about 8–12% of couples in the world.¹ 20–25% of reproductive inability can be due to male factor alone [World Health Organization (WHO), 1997].² Between countries and regions, infertility rates vary dramatically, corresponding to the incidence of preventable conditions, which can lead to infertility. In some areas, particularly in sub-Saharan Africa, up to one-third of couples are infertile and of them approximately 52% suffer from acquired infertility. On the contrary, the percentage of secondary infertility is lowest in Asia and in developed countries; 23% and 29%, respectively.^{4,5} It is a dilemma that even the most comprehensive work-up covering physical examinations, serological and hormonal tests, detailed semen analysis and imaging techniques may fail to detect the aetiology of reproductive disorders.³

In the general male population the prevalence of chromosomal abnormalities ranges between 0.7 and 1.0%.⁶ Whereas it is approximately 10.6% among azoospermic and oligozoospermic men.⁷

The frequency of karyotypic abnormalities increases with the severity of the semen parameters; the incidences among mild (oligospermic) and severe (azoospermic) groups reported as 4.6 and 13.7% respectively.⁸

Semen analysis is commonly used as a proxy measure of male fertility and to assess reproductive toxicity of environmental or therapeutic drugs.^{9,10}

Some studies have shown that basic sperm parameters such as morphology, motility and concentration are strongly associated with the probability of conception.^{11,12}

In other reports, prognostic interpretation of classical semen analysis is considered not to be straightforward, except in the presence of severe abnormalities, such as persistent azoospermia or complete lack of sperm motility.¹³

Clinical varicocele is found in 10–20% of the general male population, in 25–40% of males with primary infertility and in up to 80% of men with secondary infertility.^{14,15} Varicocele is associated with progressive and duration-dependent decline in testicular function.¹⁶

The semen analyses provide information on semen volume and sperm concentration, motility, and morphology. While reference ranges for the seven parameters of semen analysis have not been established, values based on clinical literature are available. They include ejaculate volume between 1.5 and 5.0 mL; pH greater than 7.2; sperm concentration greater than 20 million per mL; total sperm number greater than 40 million per ejaculate; motility greater than 50 percent; forward progression more than 2 (on a scale of 0 to 4); and normal morphology, which varies between the World Health Organization and Kruger.¹⁷

The incidence of varicocele is the highest (31%) and 7.4% of men are diagnosed with idiopathic infertility.¹⁸

Aim of Study

To determine the clinical patterns and to review the etiologies of infertility among men in Fallujah city and its periphery.

Patients and Methods

This is a retrospective study includes married infertile men from Fallujah city and its periphery who visited the infertility clinic between the beginning of Jan. 2006 to the end of Dec. 2010.

All patients were evaluated by history including the type of infertility (weather primary or secondary), duration of infertility, history of sexually transmitted infection (STI), genital trauma, taking medication, smoking, occupation, history of mumps or past inguinal surgical operations and sexual frequency and

performance in addition to chronic medical diseases like diabetes mellitus or chronic renal failure.

Physical examination were performed to show the testicular size, varicocele of spermatic cord, vas deferens abnormalities and secondary sexual characteristics, examination of the penis, including the location of the urethral meatus.

Investigations included two seminal fluid analyses (after three days abstinence and not more than seven days) done to all patients and the WHO criteria was depended for assessment, while hormonal study was indicated only to those patients

with severe oligospermia (less than 10 million/ml).

The statistical package for social sciences (SPSS-17) software was used for data analysis of all the findings in this study where the patients were grouped into categories as shown later.

Chi squared test was performed, and p values less than 0.05 was considered significant for differences.

Results

A total of 1410 infertile men were revised in this study, 1018 (72.2%) had primary infertility while 392 (27.8%) had secondary type.

Only 1222 patients that had infertility duration of less than five years (i.e. after the year 2005) were included in this study for more analysis, while the rest (188 patients) with longer duration were excluded.

The ages of those included infertile men were between 17 and 70 years with a mean of 30.54 ± 8.36 SD years. The duration of infertility was between 1-5 years with a mean of 2.31 ± 1.28 SD years. Of those patients, primary infertility was higher than secondary type as shown in (Table 1).

Table 1: The frequency of infertility according to type

Type	Frequency	Percent
Primary	878	71.8
Secondary	344	28.2
Total	1222	100.0

Smoking as a risk factor was studied as well, 218 (17.8%) patients were found to be smokers while 1004 (82.2%) patients were not.

Out of the smokers, 153 (17.5%) patients were with primary infertility and 65 (18.9%) with secondary infertility (Fig 1).

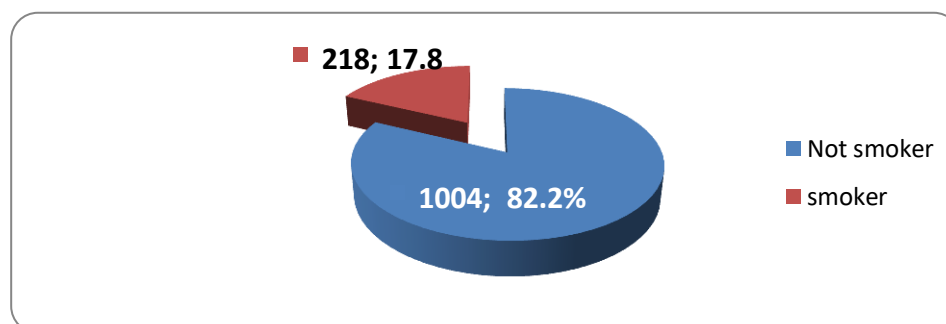


Fig. 1 The frequency of smoking among infertile men

One hundred and eight patients had history of external physical insults to gonads (testicular pathology) including inguinal hernia surgery , trauma , orchiopexy and unilateral orchiectomy, which are distributed as in the table(2) .

For those with primary and secondary type external physical insults to gonads are shown in table 2, and among those with secondary infertility as follow 312 (91.7%) ,24(7%) , 5 (1.5%) , 1 (0.3%) and 2 (0.6%) respectively (Table 2) .

Table 2: the frequency and distribution of physical insults in relation to infertility type

	Frequency	Percent of all	Within primary type	Percent of prim.	Within secondary	Percent of sec.
No insult	1114	91.2	802	91.3	312	91.7
inguinal hernias surgery	75	6.1	51	5.8	24	7
Trauma	14	1.1	9	1	5	1.5
orchiopexy	14	1.1	13	1.5	1	0.3
unilateral orchiectomy	5	0.4	3	0.3	2	0.6
Total	1222	100.0	878	100	344	100

Mumps was reported in 32 (2.6%) patients out of 1222 ; 29 (3.3%) patients

with primary type and 3 (0.9%) patients with secondary type. Fig (2)

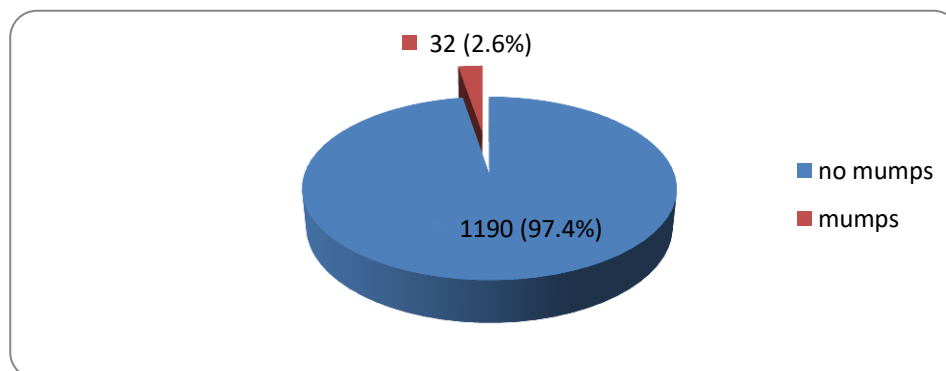


Fig (2) the frequency of mumps

Varicocele of spermatic cord was found in 186 (15.2%) out of all patient 1222. Patients with primary infertility had varicocele in 144 cases (16.4%) while they were free of it in 734 (83.6%). And those with secondary infertility varicocele was present in 42 (12.2%) and were not present in 302 (87.8%).

During this study the significant clinically evident seminal fluid analysis parameters

were considered as shown below (depending the WHO criteria for evaluation of fertility potential in males).

Sperm count was categorized as: (zero, < 5 million, 5-10 millions, > 10 – 19 million and ≥ 20 millions). In all 1222 patients the results were 126 (10%), 87 (7%), 65 (5%), 72 (6%) and 872 (72%) respectively (figure3).

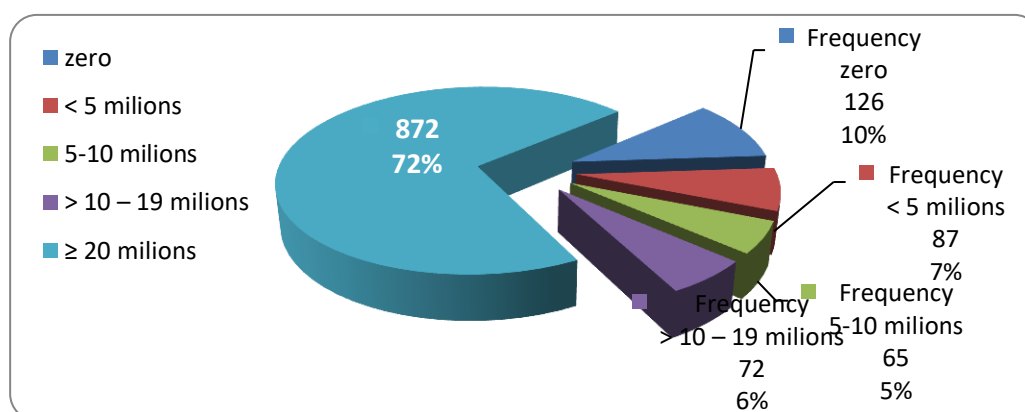


Fig (3) the distribution of sperm count

In each type (primary and secondary infertility) the sperm count distribution was considered separately in detail as in table (3).

Table (3) the distribution of sperm count in relation to infertility type

Count Infertility Type	0	<5 millions	5-10 millions	> 10 – 19 millions	≥ 20 millions	Total
primary	112	71	51	57	587	878
% within prim. type	12.8%	8.1%	5.8%	6.5%	66.9%	100.0%
secondary	14	16	14	15	285	344
% within sec. type	4.1%	4.7%	4.1%	4.4%	82.8%	100.0%
Total (prim.&sec.)	126	87	65	72	872	1222
% within all	10.3%	7.1%	5.3%	5.9%	71.4%	100.0%

$$X^2 = 34.3 \quad d.f = 4$$

$$P \text{ value} < 0.01$$

The sperm motility in all patients is shown in figure (5) below:

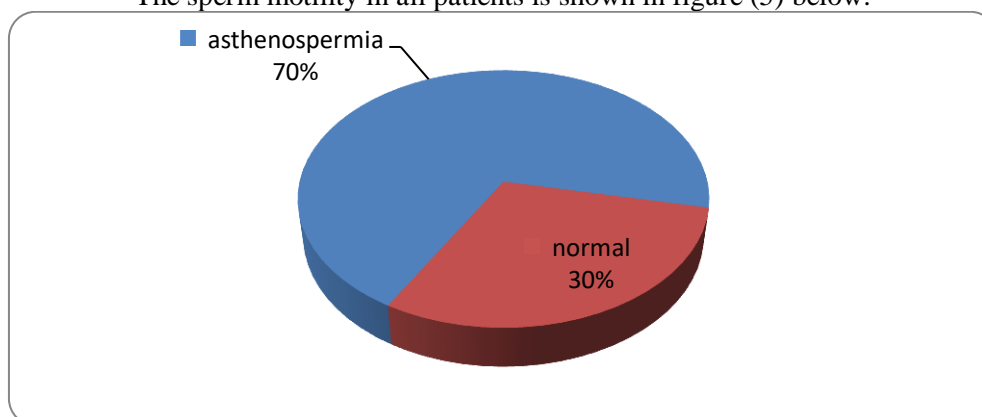


Fig (4)The frequency of sperm motility in all patients.

Among those with primary infertility and those with secondary type the frequency of sperm motility was studied within each type (table 4)

Table (4): The Distribution of Sperm motility in relation to infertility type

		Activity		Total
		Normal	Low	
Primary infertility	Count	620	258	878
	% within type	71%	29%	100%
Secondary infertility	Count	234	110	344
	% within type	68%	32%	100%
All infertile men	Count	854	368	1222
	% within all inf.	70%	30%	100%

$$P \text{ value} > 0.05$$

In all patients pyospermia (WBC more than 10 /HPF) was present in 146 (11.9%) without history of STD while it was found in 16 (1.3%) in association with STD, however 34 (2.8%) had history of STI without pyospermia.

Table (5) clarify the findings of pyospermia in patients with primary type and in those with secondary type in each one.

Table (5) frequency and distribution of pyospermia in relation to the type of infertility .

	Pyospermia				Total
	No pyospermia	Pyospermia without STI	Pyospermia with STI	STI without Pyospermia	
Primary infertility	739	104	14	21	878
% within type	84.2%	11.8%	1.6%	2.4%	100.0%
Secondary infertility	287	42	2	13	344
% within type	83.4%	12.2%	0.6%	3.8%	100.0%

P value > 0.05

Hormone assessment was done to those patients with severe oligospermia (less than 10 millions) and was found elevated in 61 (5%) of all studied patients .

According to the type of infertility, cases with primary infertility had normal hormonal state in 825 cases (94%) and

were abnormal in 53 cases (6%) (within the type) , while in cases that had secondary infertility the hormones were normal in 336 cases (98%) and abnormal in only 8 cases (2%) (within the type). Table (6).

Table (6): The Relation of Hormonal Changes and the Type of Infertility

	Hormones		Total
	Normal	Elevated	
Primary infertility	825	53	878
% within type	94%	6%	100.0%
Secondary infertility	336	8	344
% within type	98%	2%	100.0%
All patients	1161	61	1222
% within type	95%	5%	100.0%

P value < 0.05

For more accurate assessment of the idiopathic infertility, patients that had non-identifiable causes were selected, and other

patients with history of trauma , inguinal operations ,mumps, smoking, varicocele ,STI ,chemotherapy , chronic medical

illness , radiotherapy , hypospadias urethral surgery, and renal transplant were excluded.

The selected group with idiopathic infertility was 584 patients that accounts about (47.7%) of all patients with infertility , the mean of their age was 30.79 ± 7.09 SD years and their duration of infertility between 1-5 years , with mean of 2.28 ± 1.23 SD years.

Among this selected group with idiopathic infertility 410 patients (70.2%) had primary type while 174 patients (29.8%) had secondary type .

Two hundreds and one (34.4%) patients had history of one year duration , while 8 (1.4%), 148 (25.3%) , 120 (20.5%), 71(12.2%) and 36 (6.2%) had duration of two , three , four and five respectively.

Regarding Sperm count it was categorized as [azoospermia (zero) , less than five millions ,5-10 million , more than 10 – 19 million and more than 20 million]. For all patients with idiopathic infertility the distribution of count was [45 (7.7%) , 35 (6%) , 25 (4.3%) , 25 (4.3%) and 454 (77.7%) respectively] ; and within those with idiopathic infertility of primary type was [37 ,31 ,15 ,18 and 309 respectively] ; and finally in those with secondary type was [8 ,4 ,10 , 7 and 145 respectively].

Sperm motility (activity) was studied in those with idiopathic infertility, and it was found that 390 (67%) patients had low motility (asthenospermia) .

Within those patients with primary infertility 274 (66.8%) had asthenospermia while within those with secondary type, asthenospermia was found in 116(66.7%) as shown in Table 7.

Table (7): The distribution of sperm motility in idiopathic infertile men

		Activity		Total
		Low	Normal	
Primary infertility	Count	274	136	410
	% within type	67%	33%	100%
Secondary infertility	Count	116	58	174
	% within type	67%	33%	100%
All infertile men	Count	390	194	584
	% within all inf.	67%	33%	100%

P value > 0.05

Discussion:

Between countries and regions, infertility rates vary dramatically, corresponding to the incidence of preventable conditions, which can lead to infertility.

This study was designed to review the types and etiologies of male infertility in Fallujah city and its peripheries as a representative of west of Iraq since it was noticed that a high number of infertile men consulting urologists after 2004.

In some areas, particularly in sub-Saharan Africa, up to one-third of couples are infertile and of them approximately 52% suffer from acquired (secondary) infertility.

On the contrary, the percentage of secondary infertility is lowest in Asia and in developed countries; 23% and 29%, respectively.^{4,5}

In this study the mean ages of patients and duration of infertility were within the expected ranges that is noticed by other investigators, and primary infertility was the presentation in 72% of patients which is similar to that reported in articles review by Aziz and Ashok et al that was 78% of patients.¹⁸

During statistical analysis of data it was noticed that the clinical pattern of infertility and the seminal fluid analysis parameters were to some extent the same whether the data revised as infertility as a whole or subdivided into primary or secondary types, for example of those 1222 patients 878 (72%) had primary type and 344 (28%) had secondary type of infertility, which are the same percentages among those with idiopathic infertility and this was applicable to the semen fluid data.

After reviewing the most identifiable causes which were in 52% of patients, results showed causes as history of trauma, inguinal operations, mumps, smoking, varicocele, sexually transmitted diseases, chronic medical illness, chemotherapy, radiotherapy, hypospadias, urethral surgery and renal transplant. The non-identifiable causes were in 48% of patients, which was higher than results in other studies as reported by Aziz and Ashok Agarwal et al⁽¹⁸⁾ where the idiopathic infertility was 7.4% of infertile men.

Even if we exclude the chromosomal abnormalities (which represent 0.7 and 1.0% in some studies)⁶, the non-identifiable causes are still higher than reported by others so we do not consider it as a major factor or cause of infertility in this study to be concerned.

Also in this study the most obvious seminal fluid abnormality found was asthenospermia (66%) while in other studies it was (3.85%)²⁰, and one of the explanations is the exposure to an unknown toxic factors that could be due to the military events that occurred in this region before the time of study as it is known that the sperm motility is highly affected by a lot of exogenous and endogenous factors^{19,20}.

One hundred and twenty six (10%) patient had azoospermia and 350 (28%) had oligospermia were found in this study while Aziz and Ashok Agarwal et al reported that Azoospermia was (16.77%) and oligozoospermia (21.49%)¹⁸. Patients with primary infertility had significantly lower sperm counts than patients with secondary infertility.

The study also revealed that patients with primary infertility had significantly elevated hormones compared to those with secondary infertility.

The aetiology that is noticed in this study was clearly different from those reported by others for example Aziz and Ashok Agarwal et al at 2005 found that the causes of infertility was: Testicular pathology (45.1%), Varicocele (32.3%), Leukocytospermia (6.3%), Idiopathic (7.5%), Hormonal (1.6%), and (21%) of patients were smokers. On the contrary this study found that (17.8%) of the patients were smokers, testicular pathology including 108 (9%) testicular insult and 32 (2.6%) mumps, Varicocele of spermatic cord was found in 186 (15.2%) and leukospermia found in 196 (14%) most of them 146 (12%) had no history of STD. These show high rates of mumps which could be due to improper vaccination during childhood and higher rates of leukospermia without history of infection due to the social and religious restrictions for prostitutions that decrease the rate of STD, but its presence might be attributed to the exposure to toxins, immune causes or trauma.

In conclusion, non-identifiable infertility is found to be high among infertile men in Fallujah City compared to the results of other countries and previous Iraqi studies. These results may be in a way or another related to military pollution occurred in Fallujah City during 2004 that herald the need of further investigations.

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