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Original Research Article

Clinical Evaluation and Semen Analysis in Male Infertility - A Study on 100 Cases

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Abstract

One of the important and underappreciated reproductive health problems in developing countries is the high rate of infertility and childlessness. A cross-sectional type of descriptive study was conducted to evaluate the male fertility status by the conventional semen analysis. This study was conducted in which 100 men with age ranged from 20 to 45 years of a primary and secondary infertile couple of more than one year, in the Infertility OPD of Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka during October 2012 to March 2013. They were divided into two groups depending on the results of their semen analysis: 35 with abnormal semen and 65 with normal semen profile. The mean (±SD) age was 34.0±4.7 years in patients with abnormal semen and 33.9±5.6 years in patients with normal semen. Nearly one-third (31.42%) of the patients was a farmer in abnormal semen and 7.7% in normal semen. The majority (62.85%) of the abnormal semen patients worked in hot environments, STD was found 20.0% in patients with abnormal semen and 3.1% in patients with normal semen, mumps observed 8.6% in abnormal semen and 3.1% in normal semen patients. Surgical history was found 11.4% in abnormal semen and 1.5% in normal semen patients. Positive family history of infertility was found in 8.6% of abnormal semen patients but no positive family history of infertility was found in normal semen patients. Varicocele was found 25.7% in patients with abnormal semen and 21.5% in patients with normal semen. Primary subfertility was 91.4% in abnormal semen patients and 58.5% in normal semen patients. Farmer, hot working environment, STD, surgical history, positive family history, primary subfertility were significantly ($p<0.05$) higher in patients with abnormal semen. The highest number of patients were oligospermic (51.4) followed by azoospermia 22.9%, asthenozoospermia 17.1%, teratozoospermia 5.7% and aspermia 2.9%. Occupational exposure, STD, hot environment, past surgical history has a significant negative impact on male infertility.

Keywords: Infertility, Semen analysis, Reproductive life, Occupational status.

INTRODUCTION

Approximately 15% of human couples are infertile, and approximately 50% of this is because of male factors [1].

Although overall human fertility does not appear to have declined, there is evidence for a decline in sperm quality [2] and a simultaneous increase in the number of infertile couples for the last few decades. The above incidence has been estimated for the developed countries, however, proper estimates of incidence from most of the developing countries are not available.

Infertility is defined as the inability of a couple to conceive within one year of unprotected coitus[3] Nowadays, it is common practice to begin the investigation of a couple when one year has elapsed without contraception in spite of normal coitus – especially if the woman is aged over 30 years or the man aged over 40 years [3]. Infertility classified as primary infertility applies to those who have never conceived, and secondary infertility designates those who have conceived at some time in the past [4].

In the general population, conception is expected to occur in 84% of women within 12 months and 92% within 24 months. Among all infertile couples, half of them (8%) will spontaneously conceive without the need for specialist advice & treatment. Of the remaining (8%) who require treatment from the fertility clinic, half (4%) comprise couples with primary infertility, while the other half have secondary infertility [5].

Although infertility is often attributed to female causes, fertility is a two-person phenomenon [6]. It is estimated that the difficulty in conceiving is 40% due to female factors and 35% due to male factors. In 10-20% of cases, a combination of factors operates and the rest have unexplained infertility [7]. While certain cases of male infertility are due to anatomical abnormalities such as varicoceles, ductal obstructions, or ejaculatory disorders, an estimated 40-90% of cases are due to deficient sperm production of unidentifiable origin [8]. Varicocele is considered to be the commonest correctable cause of male infertility. Their incidence among infertile men is 20-40%- about three times greater than in the general population [9]. A detailed history of exposure to occupational & environmental toxins, recreational drugs and alcohol, excessive heat or radiation, and previous genitourinary infections should be elicited. Cigarette smoking has been associated with decreased sperm count, alteration in motility and an overall increase in the number of abnormal sperm. One study suggests approximately 28-71% of infertile men have evidence of a Chlamydia infection [10, 11].

One of the biggest concerns of couples involved in an infertility work up relates to the status of the male partners sperm evaluation. Semen analysis is a critical assay in the evaluation of infertility and may yield critical information regarding the etiology and prognosis of many types of reduced male infertility. Normal values of semen parameters issued by WHO in 1999 are generally used as reference values [12, 13].

Infertility is couple's problem, and both partners must be properly evaluated so that the most appropriate therapy can be tailored to the man and the woman. Whether by medical therapy or surgical means, we can treat the male partner to affect a natural pregnancy.

OBJECTIVE

To evaluate the male infertility by history taking, physical examination, conventional semen analysis and to find out the factors associated with male infertility.

MATERIALS AND METHODS

This is a Cross sectional observational study conducted in the Infertility OPD of BSMMU, Dhaka; from October 2012 to March 2013. The study population comprised of 100 male cases of both primary and secondary infertile couples. Samples ware collected from male patients aged 20 years to 45 years whose partners are below 35 years and apparently free from any abnormality related to infertility detected by clinical evaluation and investigation.

After providing proper instructions to the person regarding semen collection, semen analysis was performed as soon as the samples ware liquefied but within 01 hour of collection. The sperm count was estimated by using the Mackler counting chamber. Sperm morphology was assessed under light microscope after preparing semen smear. The semen parameter was interpreted as normal or abnormal according to WHO (1999) semen analysis references [14].

Ethical Implications

This study was approved by ethical committee of BSMMU, Dhaka. Moreover other ethical considerations like consent, confidentiality, refusal of participants and the guideline of BMRC (Bangladesh Medical Research Council) were followed while conducting the study.

RESULTS

Table I: Age distribution of the study patients (n=100)

Age (Years)	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
21-30	9	25.7	21	32.3	
31-40	24	68.6	41	63.1	
>40	2	5.7	3	4.6	
Mean ± SD	34.0	±4.7	33.9	±5.6	0.991^{ns}
Range (min – max)	(25	-45)	(22	-45)	

S=Significant, NS=Not significant
P value reached from chi square test.

Table I shows the age distribution of the study patients. The mean (±SD) age was 34.0±4.7 years with range from 25 to 45 years and 33.9±5.6 years with range from 22 to 45 years in abnormal and normal semen patients respectively. The mean age difference was not statistically significant.

Table II: Education status of the study patients (n=100)

Education level	Abnormal Semen (n=35)		Normal Semen (n=65)		P value
	n	%	n	%	
Primary	12	34.3	9	13.8	0.016[s]
Secondary	17	48.6	27	41.5	0.499[ns]
Graduate	6	17.1	19	29.2	0.183[ns]
Madrasha	0	0.0	10	15.4	0.014[s]

Table II shows the educational status of the study patients. Maximum study patients came from secondary educational level. Abnormal semen was significantly more (P<0.05) in those with lower education level and absent at Madrasha level.

Table III: Occupation of the study patients (n=100)

Occupation	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Farmer	11	31.4	5	7.7	0.002[s]
Day labour	3	8.6	4	6.2	o.468
Industrial worker	3	8.6	7	10.8	0.511
Business	12	34.3	16	24.6	0.304
Service	3	8.6	32	49.2	0.001
Expatriate worker	3	8.6	1	1.5	0.086

Table III shows the occupation status of the study patients and it was observed that majority 11(31.42%) of the abnormal semen patients were farmer.

Table IV: Working environment of the study patients (n=100)

Working environment	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Hot environment	22	62.85	19	29.2	0.001[S]
Normal environment	13	37.14	46	70.8	

Table IV explains that 22(62.85%) of the abnormal semen patients worked in hot environment and 13(37.14%) worked in normal environment. They included farmer, day labors, street hawker, stone supplier, expatriate worker.

Table V: Medical history of the study patients (n=100)

Medical History	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Chicken pox	11	31.4	14	21.5	0.275[ns]
STD	7	20.0	2	3.1	0.004[s]
Mumps	3	8.6	2	3.1	0.229[ns]
Diabetes	2	5.7	8	12.3	0.248[ns]
Tuberculosis	1	2.9	0	0.0	0.350[ns]
Hypertension	2	5.7	3	4.6	0.575[ns]

The above table shows the medical history of the study patients. STD was found 7(20.0%) and 2(3.1%) in abnormal semen and normal semen respectively. Mumps was found 3(8.6%) in abnormal semen and 2(3.1%) in normal semen patients. STD was statistically significant (p<0.05) but others medical history were not significant (p>0.05).

Table VI: Surgical History of the study patients (n=100)

Surgical history	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
No surgical history	31	88.6	64	98.5	0.049[s]
Surgical history	4	11.4	1	1.5	
Varicocele	0	0.0	0	0.0	
Transverse myelitis	0	0.0	1	1.5	
Testicular trauma	2	5.7	0	0.0	
Retroperitoneal surgery	2	5.7	0	0.0	

Table VI shows surgical history was found 4(11.4%) in abnormal semen and 1(1.5%) normal semen patients. The difference was statistically significant ($p<0.05$) between two groups.

Table VII: Family history of infertility of the study patients (n=100)

Family history of infertility	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Yes	3	8.6	0	0.0	0.040[s]
No	32	91.4	65	100.0	

The above table shows that 3(8.6%) patients had positive family history of infertility in abnormal semen patients but no positive family history of infertility was found in normal semen. The difference was statistically significant ($p<0.05$).

Table VIII: Smoking habit of the study patients (n=100)

Habit	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Smoker	15	42.9	30	46.2	0.751[ns]
Non Smoker	20	57.1	35	53.8	

Table VIII shows the smoking habit status of the study patients and it was found that 15(42.9%) patients were smoker in abnormal semen and 30(46.2%) in normal semen. The difference was not statistically significant ($p>0.05$).

Table IX: Body mass index (BMI) of the study patients (n=100)

BMI (kg/m^2)	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
<18.5	2	5.7	0	0.0	
18.5 - 24.9	19	54.3	22	33.8	
25.0 - 29.9	11	31.4	43	66.2	
≥30	3	8.6	0	0.0	
Mean±SD	23.5	±3.7	24.3	±2.3	0.185[ns]
Range (min – max)	(18.6	-29.8)	(17.4	-28.1)	

Under weight= <18.5 kg/m^2
Normal= 18.5-24.9 kg/m^2
Over weight =25.0-29.9 kg/m^2
Obesity= ≥30.0 kg/m^2

The above table shows most of the patients belonged to normal body weight. The mean BMI was 23.3±3.7 kg/m^2 in abnormal semen patients and 24.3±2.3 kg/m^2 in normal semen patients. The mean BMI difference was not statistically significant ($p>0.05$).

Table X: Examination of genitalia of the study patients (n=100)

Examination of genitalia	Abnormal Semen (n=35)		Normal Semen (n=65)		P Value
	n	%	n	%	
Size of testicles					
Smaller in size	2	5.7	0	0.0	0.120^{ns}
Normal	33	94.3	65	100.0	
Varicocele					
Absent	26	74.3	51	78.5	0.636^{ns}
Present	9	25.7	14	21.5	
Discharge from Urethra					
Positive	5	14.3	2	3.1	0.049^{ns}
Negative	30	85.7	63	96.9	
Size of the prostate					
Normal	35	100.0	65	100.0	0.00^{ns}
Enlarged	0	0.0	0	0.0	
Presence of any induration					
Mass	0	0.0	2	3.1	0.420^{ns}
Cyst	0	0.0	0	0.0	

The above table shows the genitalia examination findings of the study patients. In abnormal semen patients 2(5.7%) had smaller size testicles but all had normal size in normal semen patients. Varicocele was found 9(25.7%) and 14(21.5%) in abnormal semen and normal semen patients respectively. Discharge from urethra was positive 5(14.3%) in abnormal semen and 2(3.1%) in normal semen patients. The difference was not statistically significant ($p>0.05$) except positive discharge from Urethra.

Table XI: Type of subfertility of the study patients (n=100)

Type of subfertility	Abnormal Semen (n=35)		Normal Semen (n=65)		P value
	n	%	n	%	
Primary	32	91.4	38	58.5	0.006^{s}
Secondary	3	8.6	27	41.5	

The above table shows that primary subfertility was 32(91.4%) in abnormal semen patients and 38(58.5%) in normal semen patients. Secondary subfertility was found 3(8.6%) in abnormal semen patients and 27(41.5%) in normal semen patients. The difference was statistically significant ($p<0.05$).

Table XII: Semen analysis findings of the study patients (n=100)

Comments	Number of patients	Percentage
Normal semen		
Normozoospermia	65	65.0
Abnormal semen	**35**	**35.0**
Azoospermia	8	22.9
Oligozoospermia	18	51.4
Asthenozoospermia	6	17.1
Teratozoospermia	2	5.7
Aspermia	1	2.9

The above table shows semen analysis findings of study patients and found that in normal semen normozoospermia 65(65.0%) and abnormal semen patients was 35(35.0%) among them oligozoospermia was highest 18(51.4%) followed by azoospermia 8(22.9%), asthenozoospermia 6(17.1%), teratozoospermia 2(5.7) and aspermia 1(2.9%).

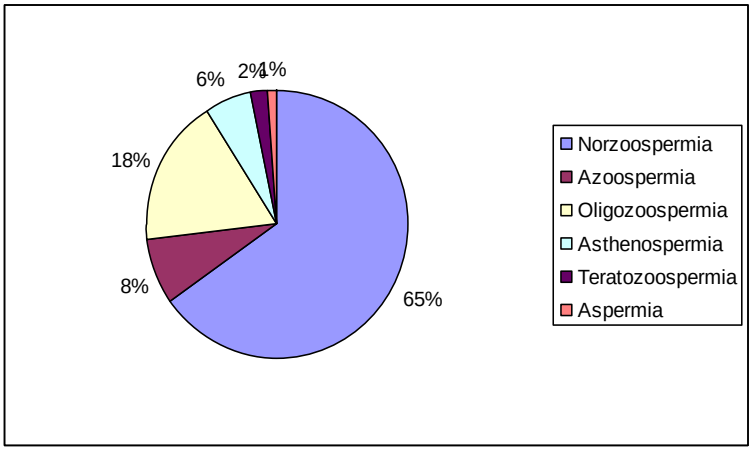

Fig 1a: Semen analysis of study patients

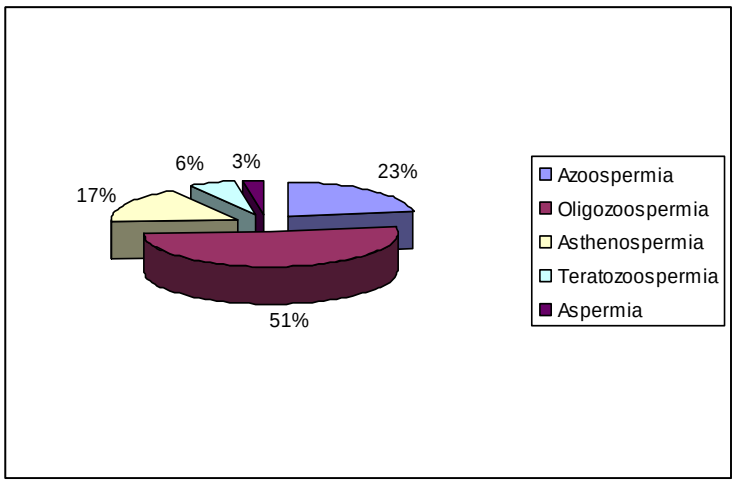

Fig 1b: Percentage of abnormal semen findings

DISCUSSION

The male factor is the cause of the infertility in about 50 % of infertile couples and is regarded as a condition that is difficult to treat in a low-cost setting. The level and patterns of infertility differ significantly between countries and regions. This variability is believed to be related to the difference in risk factors in different regions (Leke *et al*., 1993) [15].

This cross sectional observational study was carried out with an aim to find out the clinical aspect of male infertility according to recognized WHO guidelines. The study also will help to find out the correctable cause of male infertility which will help him and his partner to conceive by the most natural least invasive means possible.

In this current study it was found that in patients with normal semen normozoospermia 65.0% and abnormal semem patients was 35.0%. Bayasgalan *et al*., (2004) [16] found 55.6% men had normal semen analysis and 44.4% had abnormal seminal parameters, which is consistent with the current study. In this study, among the 35 patients with abnormal seminal parameters, out of which highest was (51.4%) Oligozoospermia followed by 22.9% Azoospermia, 17.1% Asthenozoospermia, 5.7% Teratozoospermia and 2.9% Aspermia. Bayasgalan *et al*., (2004) [16] mentioned the most (20.5%) commonly detected abnormality was azoospermia. In the remaining cases, oligozoospermia was detected in 11.6% cases and asthenozoospermia in 7.40% cases. Abnormal seminal plasma and teratozoospermia were found in 3.7% and 1.2% patients respectively.

In this present study it was observed that the mean (±SD) age was 34.0±4.7 years with abnormal semen and 33.9±5.6 years with normal semen, which was almost similar between two groups and age range was 22 to 45 years. Majority of the infertile male was in 4th decade of life. Similarly, Jan *et al*., (2011) [17] and Sadek *et al*., (2011) [18] showed the mean age of their study patients were 34.1±4.2 years and 33.3±5.16 years respectively of infertile men with varicocele. Lauren *et al*., (2011) [19] have shown the median age of participants was 36 years. Bayasgalan *et al*., (2004) [16] have shown the mean age for patients with abnormal semen was 31.2±0.4 years and 30.9±0.3 years for the patients with normal semen. On the other hand, Zhu *et*

al., (2011) [20] found a little higher mean age of their study which was 38.9±10.0 years. Other study also found no significant difference.

In this study it was also observed that primary education was significantly ($p<0.05$) higher in patients with abnormal semen (34.3%) and comparatively less (13.8%) in patients with normal semen. Maximum of the study patients had secondary educational level in both groups that was 48.6% and 41.5% in abnormal and normal semen respectively, Lauren *et al*., (2011) [19] found 19.5% had less than college level, 35.6% college level and 44.9% had level of education graduate level. Almost similar observation obtained by Safarinejad, Shafiei and Safarinejad (2010) [21]. This study is not consistent with present study may be due to socio-demographic variation.

Regarding the occupation status it was observed in this current study that nearly one third (31.42%) of the patients were farmer with abnormal semen and only 7.7% with normal semen. It was observed that a large group (62.85%) of the patient with abnormal semen worked in hot environment in compared to normal semen (29.2%). This probably explained by the fact that pesticides, hot environment and risky sexual behavior are associated with some occupations.

Sinclair and Lac (2000) [22] reported in their study that male sperm counts are declining and environmental factors, such as pesticides, exogenous estrogens, and heavy metals may negatively impact spermatogenesis. Eaton *et al*., (1986) [23] and Veulemans *et al*., (1993) [24] reported that certain pesticides and herbicides have more clearly been shown to be toxic to spermatogenesis, as have some organic chemicals. The findings of the above authors are similar with the current study. Thonneau *et al*., (1996) [25] have shown that the role of occupational exposure to heat remains significant association with abnormal semen, which support the current study.

Regarding the medical history of the present study it was observed that the sexually transmitted disease was significantly ($p<0.05$) higher in patients with abnormal semen (20.0%) then with normal semen (3.1%). Eke *et al*., (2011) [26] found the infertility due to STD was 29.6%. Mumps observed 8.6% in patients with abnormal semen and 3.1% in patients with normal semen. Almost similar findings obtained by Bayasgalan *et al*., (2004) [16], where mumps 3.2% in patients with abnormal semen and 0.4% in patients with normal semen.

In this current study it was observed that previous surgical history (testicular and retroperitoneal surgery 11.4% with abnormal semen and 1.5% with normal semen patients) was significantly ($p<0.05$) higher in patients with abnormal semen, Similar findings obtained by Ugwuja, Ugwu and Ejikeme (2008) [27], Bayasgalan *et al*., (2004) [16].

Kulikauskas et al. (1985)[10] demonstrated that smoking associated with decreased sperm count, alterations in motility and an overall increase in the number of the abnormal sperm. In this present study it was observed that percentage of smoker almost similar in two groups (42.9% in abnormal & 46.2% in normal semen patients). Similarly, Bayasgalan *et al*., (2004) [16] observed 49.2% and 48.5% were smoker in men with abnormal semen and patients with normal semen respectively. Almost similar smoker incidence was obtained by Jan *et al*., (2011) [17].

In this current study it was observed that the mean BMI was 23.3±3.7kg/m^2 with abnormal semen and 24.3±2.3 kg/m^2 with normal semen patients which was almost similar in both groups. Most of the patients belonged to normal body weight in both groups. Similarly, Lauren *et al*., (2011) [19] found the median BMI was 22.7 kg/m^2.

On urogenital examination varicocele was found 25.7% in patients with abnormal semen and 21.5% in patients with normal semen. Bayasgalan *et al*., (2004) [16] detected Varicocoele 18.4% of men with abnormal semen and 8.0% of men with normal semen ($P<0.01$). Ahmed *et al*., (2011) [28] mentioned in their study that varicoceles are found in 35% to 40% of men who have primary infertility and 75% to 80% of men who have secondary infertility but are found in only 15.0% of the general population. Chehval and Purcell (1992) [29] and Su *et al*., (1995) [30] reported that varicocele causes a duration-dependent decline in semen parameters and testosterone production. Eke *et al*., (2011) [26] have showed the causes of infertility due to varicoceles was 26.7%. Sadek *et al*., (2011) [18] found 55% cases presented with grade II varicocele and 45% with grade III varicocele. Abdel-Meguid *et al*., (2011) [31] found almost similar findings in their study. The findings of the above mentioned authors regarding the varicoceles are consistent with the current study.

Regarding the size of testicles in this present series it was observed that size of the testicles were smaller in 5.7% patients with abnormal semen but normal in patients with normal semen. Bayasgalan *et al*., (2004) [16] found the mean testicular volume of men with abnormal semen was 13.1±0.3 mL, which was significantly smaller than those of men with normal semen 14.7±0.2 mL ($P<0.01$), which support the current study.

Positive discharge from urethra was significantly ($p<0.05$) higher in patients with abnormal semen and other genitalia examination findings were almost similar ($p>0.05$) between patients with abnormal and normal semen.

In this current study primary subfertility was 91.4% in patients with abnormal semen and 58.5% in patients with normal semen. Secondary subfertility was found 8.6% in patients with abnormal semen and 41.5% in patients with normal semen. The primary subfertility was significantly ($p<0.05$) higher in patients with abnormal semen. Bayasgalan *et al*., (2004) [16] showed secondary infertility was more prevalent in men with normal semen, Eke *et al*., (2011) [26] found 36.0% and 64.0% were primary and secondary infertility respectively. Positive family history of infertility was significantly ($p<0.05$) higher in patients with abnormal semen (8.6%) but not observed in patients with normal semen.

CONCLUSION

Infertility is one of the major problems in developed as well as many developing countries. A number of socio-economic, environmental and disease entities can render a man infertile. Sometimes in spite of most meticulous search, no obvious cause can be found for the infertility, known as the idiopathic infertility, constitute a large percentage. The first test in the evaluation of infertile man is the semen analysis-this basic test gives valuable information. Occupational status, history of exposure, hot environment, past surgical history has significant negative impact on male infertility. Awareness of the magnitude and importance of the male factors in infertility is relatively recent. The study helps to find out the correctable causes of male infertility which will help him and his partner to conceive by the most natural and least invasive means possible.

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