

## Risk Factors Analysis for Abnormal Semen Characteristics in Sub-Fertile Male

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### Abstract

**Introduction:** This study aimed to identify the risk factors for abnormal semen parameters in male partner of sub-fertile couples. **Materials & Methods:** This was a prospective study of 100 diagnosed infertile & sub-fertile couples in the age group between 23-58 yrs old male were from 1st March 2013 to 28th Feb 2014 treated in Dhaka Combined Military Hospital (CMH). On the basis of sperm count the cases were grouped as follows. normozoospermia, oligozoospermia & azoospermia. Semen analysis was done in all the cases, The results were described with arithmetic mean and standard deviation. Male partners with normal semen parameters was undertaken among the sub-fertile couples attending the General Outpatient Department (GOPD) of CMH Dhaka. The history was taken from selected individual and it includes personal, socio-economics, occupational, medical, surgical history and drug intake to find out risk factors for abnormal semen parameters. **Results:** In Normozoospermia mean and SD of sperm count, sperm abnormality, sperm motility were 65.98±5.05, 24.44±1.57 and 45.5±2.94 respectively. In Oligozoospermia the mean and SD of sperm count, sperm abnormality, sperm motility were 7.74±1.23, 41.1±3.78, 14.54±2.77 respectively. In azoospermia the mean and SD of sperm count, sperm abnormality, sperm motility were absent. **Conclusion:** Here data statistically showed person with normozoospermia having good sperm morphology & motility than oligozoospermia and azoospermic subjects thereby causing male infertility which was responsible for hindrance in achieving pregnancy clinically. Using tight undergarment or working in hot atmosphere depresses spermatogenesis. Mumps orchitis permanently damage spermatogenesis. Bacterial or viral infection depresses the sperm count. Diabetes, malnutrition, heavy smoking reduces spermatogenesis.  $\beta$ -blocker, antihypertensive were likely to hinder spermatogenesis. The efferent ducts might be obstructed by infection like tubercular, gonococcal or by surgical trauma.

**Keywords:** Sub- Fertility, Sperm Count.

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### Introduction

Sub-fertility, previously known as infertility, is defined as the inability of a couple to achieve conception after one year of unprotected coitus<sup>1</sup>. Sub-fertility causes great distress to many couples & causing increasing number of them to seek specialist fertility care. It is a cause of

violence against women. In general population, conception is expected to occur in 84% of women with in 12 months and 92% within 24 months<sup>2</sup>. Sub-fertile couples pass through a painful life with psychological stress and a social disgrace in our country. It is estimated that the infertility affects 15% of couples. About 5% of male sub fertility is correctable. Male sub-fertility has been neglected more than female sub fertility worldwide, especially in developing countries including Bangladesh and is often to refer patients for specialist opinion. According to a study by Chain in Singapore in 2000, smoking, density of sperm, viability of sperm, were found to be significant predictor for sub-fertility among men<sup>3</sup>.

However, very little studies have been done to identify the original causes of male infertility and in several reports it was found that the major part of male infertility is unexplained<sup>4</sup>.

### Materials and Methods

This is a prospective study carried out with infertile and sub fertile couples treated in Dhaka CMH in the period from 01 March 2013 to 28th Feb 2014. Semen specimens were obtained from 100 consecutive male patients between 23 and 58 yrs of age. These patients attended clinical pathology laboratory, Armed Forces Institute of pathology (AFIP) for fertility evaluation. All subjects or patients were asked to produce a first semen sample after a sexual abstinence of 3 days, as because increase in abstinence with individual days significantly affects semen volume, sperm count, sperm

motility and vitality. In particular, sperm motility (percent of sperm movement) peaked after one day of abstinence in men with infertility problems. A new study shows that sperm from men with low sperm counts reached their peak condition after one day of abstinence<sup>5</sup>.

Data were collected through interview of couples who did not have child for last one year or longer even though they have had frequent unprotected sexual intercourse or couples had a child but now they are unable to procreate due to some unknown reason using structured questionnaire. Sampled size was 200 (100 infertile & sub fertile couple and 100 control subjects).

Data were processed and analyzed using Computer based SPSS (statistical package for social science) soft-ware for windows, version 16. Data presented on categorical scale will compared between groups with the help of Chi-square (X<sup>2</sup>) Test. Quantitative data were compared between groups using Student's t-Test, multivariate logistic regression analysis and fisher's exact test, as applicable. P value of less than 0.05 will be considered as significant.

**Results**

Table I shows that, in both case and control groups most of the respondents were in the 23-50 to 40 years' age group; out of the 100 respondents each in case and control group, 66% of cases and 72% of controls were in the age group. Mean ± SD of age was calculated to be, (35.60±3.049) for cases and for controls (36.88±2.387). The p-value was 0.5976 for t-test between the means and 0.565525 for chi-square among the age groups, which means there was no statistically deference in age distribution between the cases and controls.

Occupation status of the respondents more than half (54.0%) of the cases were in service or office jobs, while controls counted 46 (46.0%). There was no statistically significant difference in distribution of occupation among the groups (p-value=0.5627).

Diabetes Mellitus [odds ratio= 2.35; 95%CI = 0.4382 to 4.6668] and history of mumps [OR = 3.69; 95%CI = 0.7469 to 18.2113] were prevailing among cases.

**Table-I: Distribution of the participants by their demographic variables (n=100).**

Age years	Case (percent)	Control (percent)	t-test	p-value
<23	8.0	5.0	0.5727	0.5976
23-50	66.0	72.0		
>50	26.0	23.0		
Total	100.0	100.0		
Mean± SD	35.60±3.049	36.88±2.387		

X<sup>2</sup>=1.14; p-value=0.565525

Occupation		X <sup>2</sup>	p-value	
Service/jobs	54.0	46.0	2.047	0.5627
Business	33.0	36.0		
Daily labourer	8.0	13.0		
Agriculture	5.0	6.0		
<b>Total</b>	<b>100.0</b>	<b>100.0</b>		

Table II Shows that, there was statistically no difference between two group in duration of infertility (P=0.4754 for t-test and 0.68045 for chi-square). Both groups had a similar type of distribution of duration of infertility.

**Table-II: Distribution of the respondents by their duration of trial for a baby.**

Duration of infertility	Case Percent	Control Percent	t-test	p-value
<2 years	11.0	9.0	0.7166	0.4754
2-5 years	43.0	49.0		
>5 years	46.0	42.0		
Total	100.0	100.0		
Mean±SD	5.35±0.943	5.21±0.943		

X<sup>2</sup>=0.77; p-value=0.68045

Table III shows that the incidence of STI was higher among the cases [odds ratio=3.13; 95% CI = 0.6158 to 15.8863]. Urethral discharge was the most occurring STI in both cases and controls.

**Table-III: Distribution of the patients by their history of STs (n=100).**

H/O diseases	Case	Control
Yes	6.0	2.0
No	94.0	98.0
<b>Agents</b>		
Syphilis	1.0	0.0
Urethral discharge	4.0	2.0
Others	1.0	0.0
<b>Total</b>	<b>6.0</b>	<b>2.0</b>

Table IV Shows that, There was none with a history of taking α-Methyl dopa as anti-hypertensive. there was slightly higher number of respondents among the cases taking H<sub>2</sub> Blocker [OR=1.102; 95%CI=0.5981 to 2.0305]; but there was no strong positive association.

**Table-IV: Distribution of the patients by their history of taking medications.**

α -Methyldopa	Case	Control
	Percent	Percent
No	100.0	100.0
H <sub>2</sub> Blocker		
Yes	30.0	28.0
No	70.0	72.0
Total	100.0	100.0

Table V Shows that, the % of smoking among the cases was higher [OR = 1.71; 95% CI = 0.9713 to 3.0257]. The cases exceeded the controls in both duration of smoking and number of sticks per day. The difference of both duration (p=0.0366 for t= test and 0.0446 for chi-square) of smoking and amount of sticks smoked daily (p=0.024 for t= test and 0.000167 for chi-square) was statistically significant.

**Table-V: Distribution of the respondents according to their smoking parameters.**

Duration	Case	Control	t-test	p-value
1-5 years	14.0	19.0	2.6797	0.0366
6-15 years	23.0	13.0		
>15 years	11.0	3.0		
Mean±SD	10.49±1.783	7.5±1.342		
X <sup>2</sup> = 6.22; p-value = 0.0446				
Number of sticks per day				
5-10	10.0	23.0		
10-20	21.0	8.0		
>20	17.0	4.0		
Total	48.0	35.0	35.0	
Mean±SD	16.98±3.336	9.24±1.792	3.5402	0.024

X<sup>2</sup> = 17.39; p-value = 0.000167

Table VI Shows results of semen analysis in different groups of patients. These patients are classified into three groups like Normozoospermia, Azoospermia, Oligozoospermia.

**Table-VI: Semen analysis parameters in different groups of patients.**

Patients	N (n=59)	A (n=22)	O (n=19)
Age (years)	33.5±5.8 (56%)	31±6.9 (141%)	39±6.6 (205%)
Volume (ml)	3.36±16 (6%)	2.36±24 (11%)	2.5±17 (13%)
Sexual Abstunecnce (days)	4±1 (7%)	4±2 (18%)	4±1 (21%)
Semen pH	7.90±21 (13%)	7.92±.24 (36%)	8.11±.38 (43%)
Sperm count (10million/ml)	65.98±5.05 (112%)	Nil (0%)	7.74±1.23 (41%)
Sperm abnormality	24.44±1.57 (41%)	Nil (0%)	41.10±3.78 (216%)
Sperm motility	45.5±2.94 (77%)	Nil (0%)	14.54±2.77 (76%)

N= Normozoospermia, A= Azoospermia, O= Oligozoospermia, n= Number of subjects.

## Discussion

Combined military hospital (CMH), Dhaka is a renowned tertiary hospital in Bangladesh where this study were undertaken. Here 100 semen samples of male partners of sub fertile couples (normospermic as controls and 100 samples from male partners with abnormal semen) were analyzed in this particular study with the view to find out the risk factors of semen parameters.

During study most of the samples (case and control group) were collected from the age group between 25 years to 45 years. Among them 66% were case and 72% were control. Mean ± SD of age was calculated to be, (35.60 ± 3.049) for cases and for controls (36.88 ± 2.387). The p-value was 0.565525 for chi-square, which means there was no statistical difference in age distribution between the groups. A similar study was under taken in Eastern Nigeria, 1,110 Igbo males attending infertility clinic, where the age group selected was between 30-50 years<sup>6</sup>.

About three-fourth of the participants in both cases (74.0%) and controls (72.0%) were Muslims. More than half (54.0%) of the cases were in service or office jobs, while controls counted (46.0%). There was no statistically significant difference in distribution of occupation among the groups (p-value = .5627). In both the cases and controls, respondents were basically from middle and lower social-economic classes. Chi-square calculates, p-value = 0.8923; which explains that there was no significant statistical difference in the social-economic classes.

There was statistically no difference between two groups in duration of infertility (p=0.4754 for t-test and 0.68045 for chi-square). Both groups had a similar type of distribution of duration of infertility. Out of the 200 respondents only 7 (3.5%) had previous marriage. Inability to re-produce was the cause of discontinuation of previous marriage. 96% cases and 97% controls were struggling to get a baby being persistent with the same partner. About two-fifth of the couples in both groups (42% case and 38% controls) had intercourse for 3 to 5 times per week. On an average both group had intercourse for about 3 times per week. There was no statistical significant difference in frequency of intercourse among the groups (p-value = 0.625 for t-test and 0.767206 for chi-square).

Diabetes Mellitus [odds ratio = 2.35; 95% CI = 0.4382 to 4.6668] was found statistically significant as a cause of semen abnormality and according to Delfing in 2007, Diabetes Mellitus has a negative impact in terms of sperm quality<sup>7</sup>. Therefore it is shown that both the studies have complemented / corroborated each other. Though, Vignon et al. (1991) demonstrated Diabetes causes higher sperm concentration and abnormal morphology with no difference in motility, many of these diabetic men had fathered children and the authors concluded that Diabetes Mellitus in itself was not a cause of sub-fertility<sup>8</sup>.

History of mumps [OR = 3.69; 95% CI = 0.7469 to 18.2113] were found to be prevailing among the cases. The incidence of STIs was higher among the cases [odds ratio = 3.13; 95% CI = 0.6158 to 15.8863]. Urethral discharge was the commonest occurring STI in both cases and controls.

A prospective case control study, conducted in Mongolia during the year 1993-2002, showed adjusted odds ratios of 3.4 for mumps orchitis and 2.3 for other orchitis. Gonorrhoea was found, in that study as well, the most commonly reported STI. However as a predictor of azoospermia STIs had very high OR, being 5.6 in patients with Gonorrhoea and 7.6 in patients with other STIs<sup>9</sup>.

There was none with a history of taking  $\alpha$ -Methyldopa as anti-hypertensive. There was slightly higher number of respondents among the cases taking H<sub>2</sub> blocker [OR = 1.102; 95%CI = 0.5981 to 2.0305]; but there was no strong positive association. But according to Peter N. Kolettis in 2003, use of the drug, H<sub>2</sub> blocker-cimetidine can impair fertility<sup>10</sup>. When inquired about alcohol consumption, nobody admitted of being alcoholic and nobody had past pelvic surgery history.

The percentage of smoker among the cases was higher [OR = 1.71; 95% CI = .9713 to 3.0257]. The cases exceeded the controls in both duration of smoking and number of sticks smoked per day. The difference of both duration ( $p=0.0366$  for t-test and  $0.0446$  for chi-square) of smoking and amount of sticks smoked daily ( $p=0.024$  for t-test and  $0.000167$  for chi-square) was statistically significant. According to a study done by Chia in Singapore in 2000, smoking, density of sperm and the viability of sperm were found to be significant risk factors for infertility among men<sup>3</sup>. In a study in Turkey, cigarette smoking found to be negatively correlated with progressive motility of sperm ( $r= -0.1464$ ,  $p=0.042$ )<sup>11</sup>. A study was performed on 395 outdoor patient under infertility department of the BIRDEM, the outcome of this study showed that sperm concentration is not very much affected by smoking but the quality of sperm (sperm motility specially rapid liner movement) is grossly affected by smoking and that in turn influences the fertility status<sup>12</sup>.

All the specimens were collected at laboratory by masturbation; so, there was a minimal delay between collection and examination. The percentages of spillage were negligible. Highest number of controls was oligospermic (42.0%); followed by, azoospermia (18.0%), asthenozoospermia (16.0%), teratozoospermia (4.0%). The study, conducted by the University College Hospital, Ibadan, Nigeria, revealed 27.3% of 824 subjects had abnormal semen analysis and among them asthenozoospermia was the commonest (27.8%) of the disorders and 6.7% subjects had azoospermia. The most common multiple factors abnormality in the study population was astheno/Oligozoospermia (25.5%) while three factor defect –Oligo / Astheno. Teratozoospermia was noticed in 13.1% of the subjects<sup>13</sup>. Another study in Nigeria, 74% of subfertile men were normozoospermic, while 16.19%, 5.57% and 4.07% were azoospermic, necrozoospermic and asthenozoospermic respectively<sup>14</sup>. In Islamabad, a study showed, the Mean of sperm concentration was 0 mil/ml in azoospermic,  $6.7\pm 1.7$  mil/ml in oligospermic,  $45.8\pm 8$  mil/ml in asthenozoospermic and  $86.8\pm 7.5$  mil/ml in normozoospermic<sup>7</sup>.

## Conclusion

In Conclusion, from the study under taken in CMH for a period of one year the following conclusions were obtained: Abnormal characteristics of semen parameters found among the cases were: oligospermia (42.0%), azoospermia (18.0%), asthenozoospermia (16.0%), teratozoospermia (13.0%), oligo-teratozoospermia (7.0%) and oligo-astheno-teratozoospermia (4.0%). No aspermia was found. Majority of the male in both groups were between 25 to 40 years of age group (66% case and 72% control). About three-fourth of the participants in both groups respondents were basically from middle and lower socioeconomic classes. Statistically there was no difference between two groups in duration of infertility ( $P=0.475$  and  $0.68045$ ). Out of total 200 respondents only 7 (3.5%) had previous marriage. On an average both group had intercourse for about 3 times per week and there was no statistical significant difference in frequency of intercourse among the groups ( $p$ -value= $0.625$ ).

Diabetes mellitus [odds ratio= $2.35$ ; 95% CI= $0.4382$  to  $4.6668$ ], history of mumps [OR= $3.69$ ; 95% CI= $0.7469$  to  $18.2113$ ], history of STI [odds ratio= $3.13$ ; 95% CI= $0.6158$  to  $15.8863$ ] may had strong association with abnormal semen parameters. Intake of H<sub>2</sub> blocker [OR= $1.102$ ; 95%CI= $0.5981$  to  $2.0305$ ] was not found to be significantly associated with the semen abnormality. But smoking of cigarettes [OR= $1.71$ ; 95% CI= $0.9713$  to  $3.0257$ ] for longer duration ( $p=0.47$ ) and smoking higher number of sticks per day ( $p=0.39$ ) was statistically significantly associated with abnormal parameters.

**Conflict of Interests:** None.

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