Ibrahim Card Med J 2016; 6 (1&2): 25-32

Prevalence of Male Infertility among the Infertile Couples Attended at BIRDEM General Hospital, Dhaka

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ABSTRACT

Background & objective: Infertility is a problem of public health importance because of its high prevalence and serious social implications on affected couples and families. Although once believed that the problem is solely due to female factor, it is now generally accepted that male factor infertility is equally as important as the female factor. However, it is not known how far the problem is attributed to male factor. The present study is intended to find the prevalence of male infertility among the infertile couples and its determinants in the context of Bangladeshi population.

Patients & Methods: The present study was a descriptive cross-sectional study conducted on male partners of infertile couples (over a period of three months) visiting the Infertility Clinic of Bangladesh Institute of Research and Development in Endocrine & Metabolism (BIRDEM) General Hospital, Dhaka. Male infertility was defined as the inability of a man to make his partner conceive (because of quantitative and/or quantitative deficiency of his sperm) after 12 months of regular unprotected sexual intercourse. On the basis of semen analysis, male partners were divided into two groups – Infertile Group and Fertile Group and the suspected factors were compared between groups using crosstab analysis to determine the factors responsible for male infertility.

Result: The present study demonstrated that respondents were generally middle aged (between 30-50 years) with mean age being 35.5 years. Majority (88.5%) was Muslim and belonged to middle class (74.3%). Nearly half (47%) was service-holder and one-third (35.8%) was businessman. About 62% of the male partners were revealed to be infertile on semen analysis [combined prevalence of azoospermia (19%), asthezoospermia (29.2%) oligospermia (12.8%), and teratzoospermia (7.1%)]. Of them nearly one-third (azoospermic ones) was solely responsible for infertility and the rest played contributing role to the overall infertility. The reproductive tract infection (STDs) was reported to be alarmingly high among infertile males (21.4%) than that among their fertile peers (p = 0.002). Smoking, varicocele, overweight or obesity and diabetes also demonstrated their significant presence among infertile males compared to the fertile male group. History of occupational exposure to high temperature, pesticide, trauma to testes, abdominal and urogenital surgery were not associated with male partner fertility.

Conclusion: From the findings of the present study, it can be concluded that a substantial proportion of infertility can be attributed due to male partner infertility and its significant predictors are reproductive tract infections or sexually transmitted diseases. The second leading causes are varicocel, diabetes and obesity.

Key words: Prevalence, male infertility, determinants etc.

ORIGINAL ARTICLE

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INTRODUCTION:

Infertility is a recognized reproductive health problem worldwide with a profound psychological impact on the of the affected couples. The World Health Organization (WHO) estimates that 60 to 80 million couples or 15% of the couples worldwide currently suffer from infertility.[1] The problem of infertility in the world has grown to the extent that it is now a social and public health concern.[2] Following regular and frequent unprotected sexual intercourse, about 84% of couples in general population are expected to conceive within one year and about 92% should conceive within two years.[3,4] When a couple fails to conceive even after one year of regular frequent coitus and there is no known reproductive pathology, the couple may be considered infertile.[5] Although no epidemiological study has been conducted in the national level to assess the prevalence of infertility in Bangladesh, a global review of infertility from the World Fertility Survey estimated as 4% in Bangladesh.[6] However, another estimate of overall primary and secondary infertility in South Asia suggests a much higher rate of 15% in Bangladesh.[7]

Contrary to the widespread belief that infertility is a female problem, infertility in the male partner contributes to approximately half of all cases.[8] Even, in many studies infertility due to male factors is found to be the commonest single diagnostic category.[9] But due to the male dominance of the social structure, females are often blamed for the reason. Males are found to be solely responsible for 20-30% of infertility cases and contribute to 50% of cases overall.[10] According to the WHO, male infertility can be defined as one or more abnormalities within a semen analysis.[11] It is now becoming more documented that there is a great variation in male infertility prevalence. Previous studies have documented a prevalence of about 40-50% in African society, whereas a study from Bangladesh found 29% of men attending an infertility clinic are infertile.[12,13] A similar survey from Singapore found evidence of male infertility in 23%, while a study of 1000 infertile couples in the USA recorded 30% infertile men.[14,15] The prevalence of male infertility in Nigeria presently ranges from 20-25%.[16]

Generally, the knowledge of male infertility lags behind knowledge of female infertility until recently. It is because that women are almost always the first member of an infertile couple to seek help.[17] This is further compounded in our culture, where sexual potency is equated with normal male fertility potential and erroneous belief that reproduction is the sole responsibility of women.[18] The other reasons include paucity of information and lack of cooperation of some affected men.[19] It is, therefore, of utmost importance in investigating the prevalence of male infertility among infertile couples. However, on most occasions it has been found that, females are being treated for long time without assessing her male partner's fertility status. So it is very difficult to establish the relative contribution of the male partner in infertility. Although male infertility may result from various causes, certain causes and factors are preventable. Sexually transmitted diseases, cigarette smoking, alcohol consumption or taking recreational drugs like marijuana all are preventable causes male infertility.[20] But no epidemiological study has yet been conducted on male infertility in our country. The present study was, therefore, intended to assess the prevalence of male infertility among infertile couples of Bangladesh.

MATERIALS & METHODS:

This cross-sectional study was undertaken to assess the prevalence of male infertility among the infertile couples. The study was conducted over a period of 3 months in the Infertility Clinic of BIRDEM General Hospital, Dhaka. The infertile couples attending at the above mentioned clinic and who gave informed consent to participate in the study were included in the study. However, male partners with erectile and ejaculatory dysfunction or mentally unstable male partners were excluded from the study. Infertility was defined when female partner of a couple fails to conceive even after one year of regular coitus and there is no known reproductive pathology. Primary

Infertility was applied to those who had never conceived, whereas secondary infertility was designated to those who ever conceived at some time in the past. The male infertility was defined as the inability of a man to make his partner conceive (because of quantitative and/or quantitative deficiency of his sperm) after 12 months of regular unprotected sexual intercourse. The condition may manifest as azoospermia (total absence of spermatozoa in semen) or oligozoospermia (sperm concentration <15 million per ml of semen. Sperm concentration 5-15 106/ml represents significant and <5 106/ml represent severe oligozoospermia) or asthenozoospermia (less than 40% of the sperm remain motile for more than 2 hours after ejaculation) or teratozoospermia (presence of <40% morphologically normal forms of spermatozoa in the semen) or any combinations of the above mentioned conditions, such as oligo-terato-asthenozoospermia.

Behavioural factors (life-style factors and personal habit like cigarette smoking, alcohol intake, intake of tea or coffee, drug addiction and stress related to family and job) of the male partners were studied and were compared between infertile and fertile male partners to determine whether any of these factors carry the risk of having male partner infertility. Data were processed and analyzed using computer software SPSS (Statistical Package for Social Sciences). The test statistics used to analyse the data were descriptive statistics and Chi-square (χ^2) Test. The risk of developing male infertility due to exposure to a particular factor was estimated using Odds Ratio with its 95% confidence interval. The level of significance was set at 0.05 and $p < 0.05$ was considered significant.

RESULTS:

Demographic characteristics of the respondents are presented in Table I. About 63% of the respondents presented to our infertility clinic at their early middle age (30-40 years), 23% at middle age, 12.4% early years of married life (< 30 years). The mean age at presentation is 35.5 (range: 23-52) years. Majority (88.5%) was Muslim. Over one-quarter (27.8%) of the patients were masters level educated followed by 22.6% HSC, 21.7% SSC and 11.9% primary, 11.1% graduate level educated. In terms of occupation, over one-third (34.5%) was private service-holder and another one-third (35.8%) was businessman and 12.4% govt. service-holder. About 75% were middle class (based on income), 14.2% lower and 11.1% upper class. Majority (92.5%) did not have any history of adverse environmental exposure. Only 4.4% reported occupational exposure to high temperature, 1.3% to pesticide, 0.9% to radiation and another 0.9% to chemical etc. The mean duration of exposure was 9.1 years (Table II). About half (49.1%) of the respondents were smoker. The mean duration of smoking was 13 years and the mean number of sticks smoked each day was 8 ± 2. About 5% were alcoholics. Over half (50.8%) of the respondents was overweight or obese. Over 45% maintained good relationship with their spouse and other family members and over-one-third (36.7%) did not have a good relationship. Over 10% suffered from chicken pox, 2.3% suffered from mumps. History of suffering from TB was rare. About 10% had diabetes with mean duration of suffering from the disease being 4.8 years. Over 10% of the respondents were hypertensive with mean duration of hypertension being 3.9 years. More than 15% had sexually transmitted diseases (Table III). Eleven percent of the respondents gave the history of trauma to the testes, 14.2% had history of suffering from varicocele. Majority did not have any history of operation. (Table IV). The findings of semen analysis with mean and SD/SEM are illustrated in Table V. Based on the findings of semen analysis 29.2% had asthenozospermia alone and 19% azoospermia alone. The rest had different combinations with asthenozoospermia.

Table VI shows the association of certain putative factors with male partner infertility. The infertile males were frequently overweight or obese and smoker compared to their fertile counterparts ($p = 0.043$ and $p = 0.034$ respectively). Sexually transmitted diseases (STDs) were staggeringly higher among infertile males than that among their fertile peers ($p = 0.002$). Varicocele also

demonstrated its significant presence in the former group than that in the latter group (p = 0.014). Diabetes bears a marginally significant association with male infertility (p = 0.060), and smoking habit was considerably higher among the infertile males (p = 0.034). All other factors shown in the table were not found to be associated with male infertility. The risks of having infertility in males with STD, varicocele smoking/tobacco use and overweight or obesity are estimated to be 4.41(95% CI = 1.64-11.88), 3.08 (95% CI=1.21-7.84), 1.80(95% CI=1. 04-3.11) & 1.75(95% CI=1.02- 3.01) times higher respectively than those who do not have these factors.

TABLE I : Distribution of respondents by their demographic characteristics (n = 226)

Demographic characteristics	Frequency	Percentage
Age (yrs)		
<30	28	12.4
30-40	142	62.8
40-50	52	23.0
≥50	4	1.8
Religion		
Muslim	200	88.5
Hinduism	25	11.1
Christian	1	0.4
Education		
Illiterate	2	0.9
Primary	27	11.9
SSC	49	21.7
HSC	51	22.6
Graduate	25	11.1
Masters	63	27.9
Non-formal education	9	4.0
Occupation		
Govt. service	28	12.4
Private	78	34.5
Business	81	35.8
Teacher	11	4.9
Others	28	12.4
Social Class (Monthly taka)		
Lower (< 15000)	32	14.2
Middle (15000-40000)	168	74.3
Upper middle (40000-60000)	25	11.1
Rich (> 60000)	1	04

Mean age = (35.5 ± 5.7) years; range = (23 – 52) years

TABLE II : Distribution of respondents by occupational exposure (n = 226)

Occupational exposure	Frequency	Percentage	Mean ± SD
High temperature	10	4.4	
Radiation	2	0.9	
Chemical	2	0.9	
Pesticide	3	1.3	
None	209	92.5	
Duration of exposure (years)			9.1 ± 3.1

TABLE III : Behavioural and anthropometric characteristics of the respondents

Behavioural and anthropometric characteristics	Frequency	Percentage	Mean ± SD
Smoking related profile			
Smoker	107	47.3	-
Duration of smoking (yrs)	-	-	12.9 ± 11.2
Stick per day (n=107)	-	-	8.3 ± 2.5
Alcoholic	11	4.9	-
Overweight & obese			
(BMI 25-29.9 kg/m^2)	115	50.8	-
Relation with family members			
Good	102	45.1	-
Better	41	18.1	-
Not well	83	36.7	-
Disease suffered			
Mumps	5	2.3	-
Chicken pox	24	10.6	-
TB	2	0.9	-
Never suffered	195	86.3	-
Diabetics	21	9.3	-
Duration of DM (years)	-		4.8 ± 3.9
Hypertension	23	10.2	-
Duration of HTN (years)	-	-	3.9 ± 2.6
Medication taking (n=93)			
Antihypertensive	21	9.2	-
H_2 Blocker	61	26.9	-
Antipsychotic drugs	01	0.4	-
STD	35	15.5	-

TABLE IV: Distribution by other risk factors (trauma to testes, varicocele or surgery)

Surgical history	Frequency	Percentage
Trauma to testis	25	11.1
Suffering from varicocele	32	14.2
History of operation		
No surgery	226	96.5
Abdominal surgery	2	0.9
Urogenital surgery	2	0.9
Herniorraphy	1	0.4
Hydrocele surgery	3	1.3

TABLE V: Distribution of respondents by findings of semen analysis

Semen profile	Frequency (%)	Mean ± SD/SEM
Physical characteristcs		
Volume (ml)	---	2.48 ±1.17
Concentration (×106 ml)	---	65.88 ± 4.50
Motility (%)	---	30.41 ± 21.63
Abnormal morphology (%)	---	39.91 ± 22.13
Outcome of semen analysis		
Normal	86(38.1)	---
Azoospermia	43(19.0)	---
Asthenozoosparmia only	66(29.2)	---
Asthenozoosparmia+Teratozoosparmia	2(0.01)	---
Oligospermia+Asthenozoosparmia	17(7.4)	---
Oligospermia+Asthenozoosparmia+ Teratozoosparmia	12(5.3)	---

TABLE VI: Risk of infertility in male partners of infertile couples

Variables*	Fertility status		Odds Ratio (95% CI of OR)	p-value
	Infertile (n = 140)	Fertile (n = 86)		
Occupational exposure	11(7.9)	6(7.0)	1.1 (0.40-3.19)	0.808
BMI (≥25 kg/m^2) Smoking/	78(55.7)	36(41.9)	1.75(1.02-3.01)	0.043
Tobacco use	74(52.9)	33(38.4)	1.80(1.04-3.11)	0.034
Alcohol	7(5.0)	4(4.7)	1.08(0.31-3.80)	0.906
DM	17(12.7)	4(4.9)	2.8(0.92-8.73)	0.060
HTN	16(12.1)	7(8.5)	1.5(0.58-3.76)	0.410
STD	30(21.4)	5(5.8)	4.41(1.64-11.88)	0.002
H2-blocker	42(64.6)	19(67.9)	0.87(0.34-2.22)	0.763
Trauma to testes	16(11.8)	9(10.5)	1.14(0.48-2.71)	0.765
Varicocele	26(19.0)	6(7.1)	3.08(1.21-7.84)	0.014

Figures in the parentheses indicate corresponding %;
***Chi-squared Test (χ^2)** was done to analyse the data.

DISCUSSION:

According to WHO guideline, if an adult male has a sperm count below 20 million per ejaculate, sperm motility below 50% and abnormal morphology > 40%, the individual is considered as infertile. According to this guideline, a 62% prevalence of male partner infertility [combined prevalence of azoospermia (19%), asthezoospermia (29.2%) oligospermia (12.8%), and teratzoospermia (7.1%)] was evident in the present study. Quite consistent with this finding Bashed et al[21] in a study conducted in the Infertility Treatment & Research Centre, Dhaka demonstrated a prevalence of male infertility of 60% among infertile couples. In African countries 40% of all couples experiencing infertility, have a male factor responsible for the condition. The male factor is associated with a greater percentage of cases of primary rather than secondary infertility.[22] This was reported to be as high as 59% in France,[23] 35% in Nigeria, 26–32 % in the UK and about 36% in South Africa, Indonesia and Finland.[24,25] The high level of infertility in Africa is due largely to reproductive tract infections which may be associated with abnormal semen parameters and low sperm count.[26-28] In a Nigerian study, 42.5% (n =171) of the subjects had a sperm count of less than 20 million per ml; 13.9% (n = 56) of the subjects had azoospermia, while 53.2% (n = 214) had sperm motility of less than 50%.[29] Nigerian gynecologists frequently report that infertility cases constitute between 60 and 70% of their consultations in tertiary health institutions.[30]

In the present study as well history of reproductive tract infection (STDs) was reported to be alarmingly high among infertile males (21.4%) than that among their fertile peers. The male factor contribution to infertility in the Nigerian populations seems to be very high. Varicocel, obesity and diabetes also demonstrated their significant presence among infertile males compared to the fertile male group. Smoking behavior was significantly higher in the infertile group than that in the fertile group. History of occupational exposure to high temperature, pesticide, trauma to testes, abdominal and urogenital surgeries were not found to influence male partner fertility. Anwary et al[31] in an attempt to study the male infertility at Bangabandhu Sheikh Mujib Medical University (BSMMU) during 2007- 08, found medical disorders in 6%, history of mumps in 6%, history of orchitis in 4%, diabetes in 2%, history of smoking in 28%.

Investigating into the causes of male infertility worldwide, it is revealed that the failure of spermatogenesis and obstruction of the ductal system particularly the vas deferens were reported as the causes of the azoospermia and that the obstruction of the vas deferens was not a

major cause of azoospermia.[32] It was reported that infection of the seminal fluid was the major cause of azoospermia in infertile males as infection is known to damage the vas deferens and seminiferous tubules thereby affecting the circulating level testosterone.[33] It is now thought that post bacterial infections and idiopathic testicular pathology are common causes of azoospermia in Nigerian environment[32] and oligospermic semen is prone to be associated with bacterial infection.[34] These data seem to suggest that abnormal semen quality remains a significant contribution to overall infertility and may be associated with genital infections. In the present study, there was a higher prevalence of reproductive infections in male partner infertility and is almost comparable to those found in Nigerians suggesting that inflammatory conditions contribute more to male infertility in developing countries[35] like ours. However, a WHO study suggests that 58% of Asian men have no demonstrable cause and another 25% revealed an abnormal semen without etiological factors. The major identifiable cause of male infertility was Varicocele, affecting roughly 10% of all infertile men and infectious factors affecting another 5%.[36]

Presently male partner infertility issue is often faced by many couples. However, ours is a male-dominating society, it is so seldom talked about openly. The contribution of male partner towards couple's infertility problem was not considered seriously until the 1950s. Most textbook until then emphasized primarily the role of the female partner in this problem. Popularization of detailed analysis of semen and testicular abnormalities towards disorder of sperm production, confirm the contribution of the male partner to the couple's infertility.[37]

The staggeringly high prevalence of male infertility data may seem unbelievable to many of our gynaecologists, venerologists or epidemiologists. But when one considers that the study was done in BIRDEM and that a recent study done by Bashed et al[38] on 9000 couples demonstrated a similar report (60% prevalence of male partner infertility among infertile couples), it may not be surprising. To further judge the plausibility of the findings of the present study, let us look at the findings of similar studies conducted around the world.

Majority of young men in the 1940s had sperm counts far above 40 million per ml with averages higher than 100 million per ml. In today's Western industrialized countries, not only are sperm counts decreasing, the proportion of sperm with abnormal morphology and reduced motility is also increasing. For example, the proportion of sperm with abnormal morphology increased (from 26% to 45%) and sperm motility decreased[39] in a Danish study while in Oslo, Norway, the proportion of abnormal sperm rose from 40 to 59% between 1966 and 1986.[40] Some studies have suggested that the semen quality of sperm of young men in Northern Europe is declining.[41] Other reports have confirmed the presence of extraordinarily poor semen quality among otherwise healthy young men in the general population.[42]

Carlsen and colleagues[43] first raised the possibility of a substantial fall in male fertility levels in 1992. They reported that sperm concentration in healthy men appeared to have dropped from 113 million/ml in 1940 to 66 million/ml in 1990. Subsequent studies have confirmed and strengthened Carlsen's findings. A survey of 1,350 sperm donors in Paris found a decline in sperm counts by around 2% each year over the past 23 years with total decline of 32% and with younger men having the poorest-quality semen.[44] Similar studies have also found that sperm counts in the United States dropped by about 25% during the 1980s[45] and in Denmark dropped by about 25% between 1952 and 1972.[46]

Data available over the past 20 years reveal that in approximately 30-50% of the cases of infertility, the cause is found in the man alone, and in another 20%, the causes are found in both[47] and in 50-70%, the causes are found in the female alone.[48] The concern about this adverse trend in male reproductive health is that semen samples where the concentration of sperms is below 40 million per ml may be associated with longer time to conception or even subfertility, and

low sperm count where the concentration of

sperms is below 15 million per ml may be associated with higher risk of infertility. The difficulty inherent in defining infertility in this manner is obvious: some couples without reproductive dysfunction who wish to conceive fail to do so probably due to inadequate coital exposure or timing, while others have reproductive-system dysfunction that prevents conception. However, the downward trend in sperm quality and concentration is definitely a cause of concern for male fertility in future.

CONCLUSION:

From the findings of the present study, it can be concluded that a substatial proportion of infertility can be attributed to male partner infertility and its significant predictors are reproductive tract infections or sexually transmitted diseases. The second leading causes are smoking, varicocel, diabetes & obesity. History of occupational exposure to high temperature, pesticide, trauma to testes, abdominal and urogenital surgeries are not found to influence male partner fertility in the present study. However, further study is recommended to study the association of these factors with male infertility to validate the findings of the present study. As all these factors are closely associated with human behavior and life-style, the future incidence of male infertility is expected to rise, unless the policy-makers take immediate step to contain these factors by behavior change, communication and occupational safety measure.

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