Original Research Paper

Volume-9 | Issue-7 | July - 2019 | PRINT ISSN No. 2249 - 555X

Obstetrics and Gynecology

EPIDEMIOLOGY OF INFERTILITY PATIENTS WITH ABNORMAL SEMEN PARAMETERS

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ABSTRACT

Background: Infertility affects 8-12% of couples worldwide. Of all infertility cases, approximately 20-25% is due to male factor infertility and as many as 2% of all men will exhibit suboptimal sperm parameters.

Methods: A randomized prospective observational study was conducted in the Department of Obstetrics and Gynaecology, S.M.G.S. Hospital, Jammu from October 2017 to September 2018 after getting approval from ethical committee. A total of 240 patients coming to OPD or admitted in Gynaecology wards for infertility work up were enrolled in the study. Informed consent, thorough history of male partner and semen samples were taken.

Results: Out of 240 patients enrolled for infertility 180 patients (75%) had normal semen analysis. Only 60 patients (25%) had one or more abnormal parameter of semen analysis. Out of 60 patients with abnormal semen parameters, 26.67% (16) patients were smokers, 18.33% (11) patients were alcoholic, 8.33% (5) were tobacco consumers and 55% (33) patients were non addict. 70.00% (42) patients belonged to age group of 26-35 years, 71.67% (43) patients were having primary infertility, 55% (33) patients resided in urban area, 50%(30) belonged to middle socioeconomic status and 80% (48) patients had studied upto 12th standard.

Conclusion: Contribution of male factor in infertility is high and many of the cases still remain idiopathic. So there is a need for public education on male factor in infertility as well as research on the topic to unmask the unknown causes leading to the problem.

KEYWORDS : Male infertility, semen analysis, infertility

INTRODUCTION

Infertility and problems of impaired fecundity have been a concern through ages and is also a significant clinical problem today, which affects 8-12% of couples worldwide. Men are solely responsible for infertility in 20-25% cases, and in 20-25% of the cases along with their female partners (New 2010 WHO Standards 5th Edition)[1]. It may be one or a combination of low sperm concentration, poor sperm motility, or abnormal morphology. Known causes of male infertility include problem with sperm *production, block in sperm transport, coital problems, endocrine problems and antibodies against sperm antigens. Male infertility can be due to causal factors or potential contributing factors. Semen has two major characters:*

1. *The total number of spermatozoa:* This reflects sperm production by the testes and the patency of the post-testicular duct system.
2. The total fluid volume contributed by the various accessory glands: this reflects the secretory activity of the glands.

Male reproductive function in the general population has gained more attention due to the occurrence of several biological problems affecting the male genital tract and has increased during the last 50 years (Toppari et al., 1996)[2]. It is important to identify the cause of infertility so that appropriate treatment can be given.

METHODS

This was a randomized prospective observational study conducted in the Post Graduate Department of Obstetrics and Gynaecology, S.M.G.S. Hospital, Jammu over a period of one year i.e. October 2017 to September 2018 after getting approval from ethical committee.

A total of 240 patients coming to OPD on Mondays, Wednesdays and Fridays or admitted in Gynaecology wards for infertility work up (both primary and secondary) were included. An informed consent and a thorough history of male partner was taken to know about causal factors, contributing factors of infertility and its clinical patterns.

Semen samples obtained by masturbation after 3-5 days of abstinence and analysed as per WHO 2010 criteria in department of pathology by manual method

Semen analysis (WHO Standards 2010 5th edition):

Parameter	*Lower reference limit(range)*
Semen volume(ml)	1.5(1.4-1.7)
Total sperm number(million/ejaculate)	39(33-46)
Sperm concentration(million/ml)	15(12-16)
Total motility	40(38-42)
Progressive motility (%)	32(31-34)
Vitality (live sperms %)	58(55-63)
Sperm morphology (%)	4(3-4)
pH	>7.2
Peroxidase positive leucocytes (million/ml)	<1.0

The patients who came with abnormal semen reports from any laboratory, the results were reconfirmed by repeating their semen analysis in S.M.G.S. hospital done under the department of Pathology.

In patients with no positive history and normal semen analysis male factor of known cause was ruled out. If a patient was having some abnormal factor in semen analysis, a repeat semen analysis was done after 6 weeks and if that too was abnormal, urologist consultation was sought.

At the end of the study data was compiled and analysed by appropriate statistical tests.

RESULTS

Out of 240 patients enrolled for infertility 180 patients (75%) had normal semen analysis. Only 60 patients (25%) had one or more abnormal parameter of semen analysis (Table 1).

Table 1: Semen Analysis

Semen analysis	Number	Percentage (%) with 95% CI
Normal	180	75.00 (69.16 - 80.06)
Abnormal	60	25.00 (19.9 – 30.8)
Total	240	100.00

*CI- Confidence Interval.

Abnormal colour was present only in 2 (3.33%) patients, abnormal volume in 16.67% (10) patients, abnormal liquefaction time in 25% (15) patients, abnormal pH was seen in 20% (12) patients, abnormal count was present in 45% (27) patients, abnormal concentration in 20% (12) patients, progressive motility was abnormal in 38.33% (23) patients and morphology was abnormal in 6.67% (4) patients. More than one parameter was abnormal in 14 (23.33) patients (Table 2).

Table 2: Abnormal semen analysis (n=60)

Semen parameters	Abnormal (No.)	Percentage (%) with 95% CI
Colour	2	3.33 (0.92 – 11.36)
Volume	10	16.67 (9.32 – 28.04)
Liquefaction time	15	25.00 (15.78 - 37.23)
pH	12	20.00 (11.83 – 31.78)
Total sperm count	27	45.00 (33.09 – 57.51)
Sperm concentration	12	20.00 (11.83 – 31.78)
Progressive motility	23	38.33 (27.09 – 50.98)
Morphology	4	6.67 (2.62 – 15.93)

Out of 60 patients with abnormal semen parameters 26.67% (16) patients were smokers, 18.33% (11) patients were alcoholic and 8.33% (5) were tobacco consumers.55% (33) patients were non addicted (Table 3).

Table 3: Addiction in males with abnormal semen parameters (n=60).

Addiction	Number	Percentage (%) with 95% CI
Smokers	16	26.67 (17.14 – 39.01)
Alcoholics	11	18.33 (10.56 – 29.92)
Tobacco consumers	5	8.33 (3.61 – 18.06)
No addiction	33	55.00 (42.49 -66.91)
Total	60	100.00

*More than one addiction was seen in 4 patients.

Relationship of various epidemiological factors with abnormal semen analysis reports was studied. Maximum number (42/ 70.00%) of patients with abnormal parameters on semen analysis belonged to age group of 26-35 years. 71.67% (43) patients were having primary infertility and 28.33% (17) patients had secondary infertility. 55% (33) patients resided in urban area compared to 45% (27) patients who belonged to rural areas. Maximum number of patients (30 / 50%) belonged to middle socioeconomic status.80% (48) patients had studied upto 12th standard (Table 4).

Table 4: Epidemiology of abnormal semen parameters (n=60):

Epidemiological parameter	Abnormal semen No.	Percentage (%) with 95% CI
Age:		
<25 yrs (n=32)	8	13.33 (6.91 - 24.16)
26-35 yrs (n=177)	42	70.00 (57.49 - 80.1)
>35 yrs (n=31)	10	16.67 (9.32 - 28.04)
Type of infertility:		
Primary infertility (n=163)	43	71.67 (59.24 - 81.50)
Secondary infertility (n=77)	17	28.33 (18.5 - 40.76)
Place of residence:		
Urban residence (n=114)	33	55.00 (42.49 - 66.91)
Rural residence (n=126)	27	45.00 (33.09 - 57.51)
Socioeconomic status:		
Upper SE status (n=43)	11	18.33 (10.56 - 29.92)
Middle SE status (n=146)	30	50.00 (37.74 - 62.26)
Lower SE status (n=51)	19	31.67 (23.31 - 44.24)
Educational level:		
Illiterate (n=7)	1	1.67 (0.3 - 8.86)
Upto 12th standard (n=167)	48	80.00 (68.22 - 88.17)
>12th standard (n=66)	11	18.33 (21.31 - 44.24)

Out of 240 patients 3.75% (9) patients had endocrine disorder, 2.5% (6) patients had varicoceles, 22.5% (54) patients had leucocytospermia, 6.67% (16) patients had some chronic disease and 1.6% (4) patients had undergone surgery for inguinal hernia. No patient had history of congenital/acquired urogenital abnormality, malignancies or testicular trauma (Table 5).

Table 5: Contributing factors in infertility patients

Factor	Present No.(n=240)	Percentage(%) with 95% CI
Congenital or acquired urogenital abnormality	-	-
Malignancies	-	-
Endocrine disorders	9	3.75 (1.99 – 6.97)
Varicoceles	6	2.5 (1.15 – 5.35)
Leucocytospermia	54	22.5 (17.67 – 28.19)
Chronic diseases	16	6.67 (4.15 – 10.56)
Hernia operations	4	1.6 (0.65 – 4.21)
Testicular traumas	-	-

*More than one factor may be present in some patients.

33.33% (3) patients with endocrine disorders, 33.33% (2) patients giving history of varicocele, 25.93% (14) patients having leucocytospermia, 37.50% (6) patients having chronic diseases and 25% (1) patients having history of inguinal hernia had abnormal semen analysis parameters (Table 6).

Table 6: Contributing factors in patients with abnormal semen analysis parameters.

Factor	Present No.(abnormal semen parameters)	Percentage (%) with 95% CI
Congenital or acquired urogenital abnormality	-	-
Malignancies	-	-
Endocrine disorders (n=9)	3	33.33 (12.06 - 64.58)
Varicoceles (n=6)	2	33.33 (9.68 - 70)
Leucocytospermia (n=54)	14	25.93 (16.12 -38.94)
Chronic diseases (n=16)	6	37.50 (18.48 – 61.36)
Hernia operations (n=4)	1	25.00 (4.56 – 69.94)
Testicular traumas	-	-

DISCUSSION

The mean age of females included in the study was 27.08+_4.24years and the mean age of males was 30.51+_5.04 years . It is consistent with studies by Paul C. Adamson et al (2011)[3] and Moumita Pal et al. (2018)[4]. In another study by Kalavathi DB et al 2016[5], the mean age of the men 28.4+_4.5 years with majority (54%) in the age group of 25-35years age group . Mahboubi M et al 2013[6] found mean age of infertile males 36.3+_10 years. However, the differences from the studies of abroad can be explained due to early age of marriage in India.

Out of 240 patients enrolled for infertility 180 patients (75%) had normal semen analysis. Only 60 patients (25%) had one or more abnormal parameter of semen analysis. Nwajiaku LA et al 2009[7] in their study conducted on 268 infertility patients over a period of 5 years, that presented at Nnamdi Azikiwe University Teaching Hospital, Nnewi, South East Nigeria 25.5% of the patients had solely male factor infertility which is consistent with present study.

Kalavathi D Biradar et al 2016 in their study conducted in Bangalore, over a period of six months on a total of 250 infertile couples found that 34.4% had abnormal semen parameters and 65.6% had normozoos permia, 25% had oligozoospermia, 8.4% had azoospermia, and only 1.3% had asthenozoospermia. Mahboubi M et al 2013 in their case-control study which included 268 men attending an infertility clinic in Shiraz, Iran studied that 34.4% of infertile men were smokers.

Maximum number (42/ 70.00%) of patients with abnormal parameters on semen analysis belonged to age group of 26-35 years. 71.67% (43) patients had primary infertility and 28.33% (17) patients had secondary infertility. 55% (33) patients resided in urban area as compared to 45% (27) patients who belonged to rural areas. Maximum number of patients (30 / 50%) belonged to middle socioeconomic status.80% (48) patients had studied upto 12th standard. Punab et al 2016[8] in their 9-year prospective monocentric study on 1737 patients with reduced total sperm counts conducted in Andrology Center, Tartu University Hospital, Estonia found that the mean age of infertile patients with abnormal parameters was 33.2 years and that the mean duration of infertility was 3.1years with a range of 1 to 10 years, 83.2% of the patients had primary and 16.8% of the patients had secondary infertility. J. Gao et al 2006[9] conducted a population based study of

semen quality in Chinese population and found that maximum number of patients belonged to 25-35 years age group, 80.5% of them were educated upto high school, 56.3% of them were from middle class and lower middle class. As far as residence was concerned 53.2% of them were residing in urban areas and 46.8% were from rural areas. All the findings are in accordance with present study.

Among infertility patients; 33.33% patients having endocrine disorders, 33.33% patients with a history of varicocele, 25.93% patients having leucocytospermia, 37.50% patients having chronic diseases and 25% patients having a history of inguinal hernia had abnormal semen analysis parameters. Punab et al 2016 conducted a 9-year prospective monocentre study on 1737 patients with reduced total sperm counts in Andrology Center, Tartu University Hospital, Estonia. In their study they found 25.93% of patients with infertility had varicocele, 13.41% infertile men had leucocytospermia, 24.4% of patients had some chronic disease. Hull et al 1985[10] studied a group of 708 couples within a population of residents of a single health district in England and found prevalence of varicoceles to be 12-42%.

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