Effective Evaluation of Male Infertility by Semen Analysis in Tertiary Care Center

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Abstract

Background: Semen analysis (SA) represents the most basic evaluation of male infertility. The evaluation of semen parameters is currently based on the standards defined in the laboratory manual for the examination and processing of human semen created by the World Health Organization (WHO). Studies showed 30% of men with a normal semen analysis actually have abnormal sperm function. Careful evaluation of different parameter in on semen analysis may suggest the possible causes of infertility.

Method: semen samples were analyzed by manual method. An analysis done for volume, viscosity, sperm concentration, motility, and morphology, according to WHO guidelines on semen analysis was done.

Results: According to WHO criteria 118 sample was assessed, 74 sample shows abnormality. In which 36.48% males had volume < 2 ml, 67% males had oligospermia (< 15million/ml sperm count), 6.7% Azoospermia and 78.37% had abnormal morphology.

Conclusion: semen analysis is the diagnostic tool to find out male infertility. Sperm concentration, motility and morphology are related to each other, factors that cause deterioration of one of them usually also have negative impact on the other two as well. Males contribute towards infertility in couples significantly.

Keywords: Semen, Male Infertility, India.

Introduction

Semen analysis is a laboratory test that is performed to assess male fertility. Infertility is defined as the inability to conceive after 1 year of unprotected sexual intercourse. About 15% of all couples in reproductive-aged couples experience infertility. Infertility in a male is assessed by taking a detailed medical and sexual history, a complete physical examination, and semen analysis. The male factor significantly contributes to 30% of the infertility cases and is a contributing factor in about half. [1][2][3]. Semen analysis is a procedure in which specialists examine and evaluate the health, vitality, and overall quality of a man's semen and sperm is known as Semen Analysis. Also known as the sperm count test, a semen sample is used by a pathologist to check for a number of aspects that may affect overall fertility.

Infertility is a condition with psychological, economic, medical implications resulting in trauma, stress, particularly in a social set-up like ours, with a strong emphasis on child-bearing.

Semen can be assessed by various attributes: the total number of spermatozoa, the fluid volume, sperm concentration, and the nature of the spermatozoa; their viability, motility, and shape as well as the composition of the secretions. Detailed analysis of these factors can help identify the reason for the male factor infertility. [4].

According to the records from the World Health Organization (WHO), about 40% of infertility cases are due to male factors which are due to aging processes that lead to decrease sperm motility, sedentary work, and lack of exercise [5]. Other factors are infection and oxidative stress and an increase in inflammatory cytokines in seminal plasma that decreases sperm quality and damage sperm DNA [6], [7]. Nutritional factor had an important role in sexual health and semen quality, especially Vitamin D deficiency [8].

The object of this study to find out the different pattern of semen analysis in male infertility and evaluate frequency of distribution of semen abnormality.

Material and Method

It was a Retrospective study on semen analysis of the male partners of infertile couples who presented at S.R.V.S medical college Shivpuri, India was done between January 2022 to march 2023. Semen collection was done at the hospital in sterile plastic containers by masturbation after 3 days of abstinence. Samples were delivered within one hour of collection and analyzed by manual method. Analyses were done for volume, viscosity, sperm concentration, pH, motility, and morphology, according to WHO guidelines on semen analysis. A total of 118 cases were included in study.

Study included the frequency of distribution of physical or microscopic abnormality, proportion of each abnormality and observed combined defects.

Result

A total of 118 samples were analysed, Mean age of the men in this study was 29.74 years.

Table 1: Age wise distribution of study population

S. No.	Age group	Frequency (No.)	Percentage %
1	21-30	48	40.6
2	31-40	57	48.3
3	41-50	10	8.4
4	51-60	03	2.5

Out of 118 semen sample, in this study 74 sample were abnormal sample. Maximum number of male i.e.73.9% had duration of infertility below 5 year, 24.32 % between 5-10 year and 2.7% with more than 10 year of infertility. The chi-square statistic is 4.5081. The p-value is 0.033736. The result is significant at $p < .05$.

Table-2: Duration of infertility in year

S. No.	Duration of Infertility (year)	Frequency (No)	Percentage %
1	<5	54	73.9
2	5-10	18	24.32
3	>10	02	2.7

Out of 74 abnormal semen sample 74.32% were below 40 year and 25.67% above 40 year.(table-3) as we think about semen volume 36.48% male had <2ml, 56.75% had volume between 2-4 ml and 3.7% had semen volume between 4-6ml. 67% had sperm count less than 15 million per ml i.e. oligospermia. and 6.7% had Azoospermia.

In this study 37.83 % patients had less than 25 % motile sperm per hpf. 78.37% had abnormal form and 21.62 % had normal form.

Pus cell present in 72 abnormal semen sample. some other abnormality also present like asthenospermia, 12% semen sample had agglutination

Table 3: Distribution of age in abnormal semen sample

Age in year	Number	Percentage (%)
<40	55	74.32
>40	19	25.67

Table 4: Distribution of semen volume

Distribution of semen volume		
Volume in ml	Frequency (n)	Percentage (%)
<2	27	36.48
2-4	42	56.75
4-6	05	3.7

Table 5: Distribution of sperm count

Count million/ml	Frequency	Percentage (%)
Oligospermia (<15)	50	67
Normospermia (15-50)	15	20.2
Normospermia (>60)	04	5.4
Azoospermia	05	6.7

The chi-square statistic is 4.2282. The *p*-value is .039757. The result is significant at $p < .05$.

Table -6: Proportion of motile sperm

Proportion of motile sperm		
Motility of sperm in %	Number of sample	Percentage (%)
<25	28	37.83
25-50	40	54.05
50-75	05	6.7
75-100	01	1.3

The chi-square statistic is 3.9658. The *p*-value is .046433. The result is significant at $p < .05$.

Table -7: Abnormal morphology and Pus cell distribution

Abnormal form	Frequency (n)	Percentage (%)
Present	58	78.37
Absent	16	21.62
Pus cells		
present	72	97.2
Absent	02	21.62

The chi-square statistic is 12.3966. The p-value is 0.00043. The result is significant at $p < 0.05$.

Discussion

Semen quality is an important factor in determining infertility and females are main target of society for this dilemma and there are many risk factors for female infertility such as previous CS, menstrual cycle disturbance, regular daily caffeine intake, and obesity [9]. So many researches and my study also proove that not only female but male also responsible for infertility. Thus, screening of males by simple semen analysis test gives an idea about the pathological infertility problems.

In this study we discuss semen volume, motility, morphology pus cell and other abnormality. There are many studies also conducted on similar paramete. most common abnormality was found in sperm motility and morphology.

Jajoo et al who found 62% had duration of infertility below 5 years, 32% between 5-10 years and there were 6 (6%) with more than 10 years of infertility [10]. In this study 73.9% had duration of infertility below 5 year, 24.32% between 5-10 year and 2.7% with more than 10 year i.e. approximate correlate with Jajoo study.

According to a study by Mohammad et al on infertile males,89.7% had normal semen volume. [11] In a study at Bangalore by Joshi et al 6% cases had semen volume of less than 2 ml [12]. A study conducted at rural central India revealed that 22% of cases had semen volume of less than 2 ml [13]. 33.8% males had semen volume less than normal in Nigeria study [14]. In this study 36.48% had semen volume <2ml, 56.75% had volume between 2-4ml and 3.7% male had volume between 4-6ml. [15]

In this study 67% male had sperm count <15 million/ml, while 44% in Gerzia study, and 25 % in Jajoo et al. In our study 37.83 % male had sperm motility <25% sperm/hpf. And 54.05% had motility between 25-50% /hpf. Motility is one of the most important factor of male infertility.

In this study 21.62% had normal morphology and 78.37 had abnormal morphology similar result present in study of Atken et al, Mcleod et al and Larry that show infertile male carry a higher percentage of abnormal forms.

This study showed the frequency of normospermia (25.6%), oligospermia (67%), and azoospermia (6.7%) in male infertile subjects and the distribution of other abnormal semen parameters was hypospermia (<2ml) (36.48%), hyperspermia (>5ml) (3.7%), and teratospermia (78.37%). Khan DA et al. syudy show Azoospermia affects about 4.5% of the study male population and may be due to sperm production or transport, while oligospermia about 12%. Another study showed that the prevalence of azoospermia was 14.28% and oligospermia was 21.43% there some variation in result i. e. may be because of sample size.

Conclusion

Semen analysis is one of the important screening test for diagnosis of male infertility. It can detect treatable abnormalities, evaluation of the infertile man is critical to uncover life-threatening problems associated with the symptom of infertility. semen parameter morphology, motility volume are important parameter of male reproductive system. After this study found that male play a significant part in infertile couples. Further study required for confirmation because semen analysis is one of the screening test.

References

1. Vander Borght M, Wyns C. Fertility and infertility: Definition and

epidemiology. Clin Biochem. 2018 Dec; 62:2-10.

2. National Collaborating Centre for Women's and Children's Health (UK). Fertility: Assessment and Treatment for People with Fertility Problems. Royal College of Obstetricians & Gynaecologists; London: Feb, 2013.

3. Thonneau P, Marchand S, Tallec A, Ferial ML, Ducot B, Lansac J, Lopes P, Tabaste JM, Spira A. Incidence and main causes of infertility in a resident population (1,850,000) of three French regions (1988-1989). Hum Reprod. 1991 Jul;6(6):811-6.

4. Leslie SW, Soon-Sutton TL, Khan MAB. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Mar 3, 2023. Male Infertility.

5. Harmoosh SK, Almadfaiee ZA. Estimation of the seminal fluid of subfertile patients of different age groups. J Facult Med Baghdad. 2011; 53:428-31.

6. Seshadri S, Bates M, Vince G, Jones DI. The role of cytokine expression in different subgroups of subfertile men. Am J Reprod Immunol. 2009;62 (5): 275-82.

7. Lazem A, Al-Kaseer E, Al-Diwan J, Al-Hadithi T. Effect of infection on semen parameters in a sample of Iraqi infertile males. J Fac Med Bagdad. 2010; 52:274-6.

8. Arab A, Hadi A, Moosavian SP, Askari G, Nasirian M. The association between serum Vitamin D, fertility and semen quality: A systematic review and meta-analysis. Int J Surg. 2019; 71:101-9.

9. Ajeel NA, Abdul-Kader RA. Female infertility: A study of risk factors. J Facult Med Baghdad. 2014;56:200-4

10. Sigman M, Lipshultz LI, Howards SS. Evaluation of the subfertile male. In: Lipshultz LI, Howards SS eds. Infertility in the Male. 4 th ed. St. Louis, Missouri: Mosby-Yearbook; 1997:173.

11. Adeiji RA, Olayemi O, Okunlola A, Aimakhu CO. Pattern of semen analysis of male patners of infertile couples at the University College Hospital, Ibadan. West Afr J Med. 200 30020; 002022:243-5.

12. Joshi P, Gopal N, Bhat V. Study of semen analysis patterns in infertile males. Int J Pharm Bio Sci. 2011; 1(1):44-9.

13. Jajoo S, Kalyani KR. Prevalence of abnormal semen analysis in patients of infertility at a rural setup in Central India. Int J Reprod Contracept Obstet Gynecol. 2013;2(2):161-4.

14. Onyeka CA, Ashiru OA, Duru FI, Olorunfemi OJ, Fabunmi OO, Oluwatuyi TS. Semen analysis of 263 sample men from infertility clinic in western Nigeria. West Afr J Assist Reprod. 2012;2(1):1-16.

15. Chakdoufi S., Moumen A., & Guerboub A. Dyslipidemia and Diabetic Retinopathy in Moroccans Type 2 Diabetics Patients: A Cross-Sectional Study. Journal of Medical Research and Health Sciences, 2023; 6(3): 2471–2479.