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Original Research Article

Role of Semen Analysis in Diagnosis of Infertility and Factors Affecting It: A Descriptive Observational Study from Tertiary Care Centre of Karnataka

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Abstract:

Introduction: Despite the increasing incidence and the difficulty in treating male infertility, there has been limited documentation of the leading causes and risk factors for male infertility. Understanding the causes and risk factors will enable the identification of primary prevention methods, as well as effective methods for the primary treatment of male infertility.

Objectives: To evaluate the seminal pattern in male infertility and factors affecting the male infertility.

Materials and Methods: The present descriptive observational study was carried out at Department of Pathology KIMS, Hubli during January 2023 to December 2023 involving 100 cases for semen analysis.

Results: We observed that almost 16% of the cases the sperm motility was less than 50%. 45% of the cases have oligoasthenozoospermia. 36% of the patient has oligozoospermia. Smoking and chewing affect the sperm count significantly in our study. Chronic addictions significantly affect the sperm motility.

Conclusion: Chronic smoking and alcoholism as the important risk factors for low semen count and sperm motility in our study.

Keywords: Seminal Pattern, Male Infertility, Factors Affecting.

Introduction

Infertility is "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse". [1] It has psychological, economic, demographic and medical implications. World Health Organization (WHO) estimates that 60-80million couples worldwide suffer from infertility and the prevalence of infertility in India to be 3.9%- 16.8%. [2] Male infertility refers to a male's inability to result pregnancy in a fertile female. Semen analysis is routinely used to evaluate the male partner in infertile couples. In 50% of involuntarily childless couples, a male-infertility-associated factor is found together with abnormal semen parameters. [3]

The WHO estimates the overall prevalence of primary infertility in India to be between 3.9 and 16.8 per cent. [4] Estimates of infertility vary widely among Indian states from 3.7% in Uttar Pradesh, Himachal Pradesh and Maharashtra, to 5 per cent in Andhra Pradesh, and 15 per cent in Kashmir. [5-7] Moreover, the prevalence of primary infertility has also been shown to vary across tribes and castes within the same region in India. [8] However, it should be noted that many of these estimates use different definitions of infertility and consider different time periods, which makes direct comparisons difficult between any studies. [8]

In India, the extent of overall primary and secondary infertility among the women at the end of their reproductive careers (aged 45-49) was reported to be around 8%.9 However; the rate of infertility has decreased by 7.7% from NFHS-2 to NFHS-3 in India. It is around 2% in NFHS-2 and around 1.85% in NFHS-3. [10] A study conducted among the women in age group 15 -30 years in Mysore reported 12.6 per cent (95% Confidence Interval (CI): 10.5-15.0%) prevalence of primary infertility. [11] The extent and cause of infertility depends on various socio-cultural factors that directly or indirectly influence sexual practices and behaviours leading to infertility. Various factors like age at marriage, place of residence, social class and educational status of women could be some of the factors of infertility

among women in India. Also, there are numerous factors such as anatomical, physiological and genetic factors that cause infertility. Many environmental and acquired factors also lead to inability to conceive. The exact incidence of infertility is difficult to estimate as many eligible couples, especially living in rural and remote areas, do not seek help or consult specialized health care providers in India. [12]

Objectives: To evaluate the seminal pattern in male infertility and factors affecting the male infertility.

Materials and Methods

Study Setting: Department of pathology at Karnataka Institute of Medical Sciences Hubli, Karnataka

Study Subjects: Males with the complaint of infertility of whom semen samples collected for analysis

Study Design: Descriptive observational study

Study duration: January 2023 to December 2023

Sample size: 100

Inclusion Criteria: All the cases of primary and secondary infertility diagnosed by the gynaecologist after full examinations and laboratory tests.

Methods of Data Collection: Samples collected in sterile containers were analysed, primarily for fructose, sperm count and motility of the sperm. Examination was done via light microscopy.

And results were compared to the WHO standards.

Motility was assessed using the sperm progression rating:

A. Rapid forward progressive motility;
B. Slow or sluggish progressive motility;
C. Nonprogressive motility;
D. Immobility.

Results

Table 1: Distribution according to age group

Age	Number of Patients	Percentage
21 – 25	10	20%
26 – 30	20	40%
31 – 35	15	30%
36 – 40	05	10%
Total	**50**	**100%**

Total 100 semen samples were analysed, of which 50 were found to be abnormal in our study. Majority of the cases were from 26-30 years age group i.e. 20 (40%) followed by 15(30%) from 31-35 years, 10(20%) from 21-25 years, and 5(10%) from 36-40 years age group.

Table 2: Distribution of cases according to semen quantity

Semen quantity (cc)	Number of Patients	Percentage
<1	08	16%
1.1< 2	28	56%
2.2 < 3	08	16%
> 3	06	12%
Total	**50**	**100%**

We observed that semen quantity was less than 1 cc in 8 patients i.e. 16%, less than 2 cc in 28 cases (56%), less than 3 cc in 8 cases i.e. 16% and more than 3 cc in 6 patients i.e. 12%.

Table 3: Distribution of cases according to sperm density (million/ml)

	Number of Patients	Percentage
< 20	08	16%
10.1< 20	28	56%
< 10	08	16%
Total	**50**	**100%**

Distribution of cases according to sperm density (million/ml) revealed that it was less than 20 million /ml in 16%, 10.1-20 million/ml in 56% and less than 10 million/ml in 16% cases

Table 4: Distribution of cases according to sperm motility

sperm motility	Number of Patients	Percentage
Actively motile	10	20%
Sluggishly motile	12	24%
Non motile	28	56%
Total	**50**	**100%**

We observed that 56% of the samples showed non-motile sperms in our study. This is followed by 24% cases with sluggishly motile sperms and remaining 20% with actively motile sperms in our study

Table 5: Distribution according to frequency of motile sperms

Motile sperms	Number of Patients	Percentage
< 50%	8	16%
20.1 to 50%	12	24%
Less than 20%	30	60%
Total	**50**	**100%**

We observed that almost 16% of the cases the sperm motility was less than 50%. In 24% of the cases the motility was between 20-50% and in majority of the cases that is 60% patients having sperm motility of is than 20%.

Table 6: Distribution according to findings

	Number of Patients	Percentage
Oligozoospermia	18	36%
Oligoasthenozoospermia	22	45%
Azospermia	7	14%
Aspermia	1	2%
Cryospermia	1	2%
Nacrospermia	1	2%
Total	**50**	**100%**

Our findings revealed that 45% of the cases have oligoasthenozoospermia. 36% of the patient has oligozoospermia. 14% have azoospermia. 2% each have aspermia, cryopsermia and nacrospermia.

Table 7: Factors affecting the sperm count

	Low sperm count		Normal sperm count		p value
	No	%	No	%	
Chronic smokers and tobacco chewers	21	42.0	13	26.0	0.045
Chronic alcoholics	15	30.0	7	14.0	0.04
No addiction	14	28.0	30	60.0	0.032
Total	**50**	100.0	**50**	100.0	

42% of the cases with low sperm count were chronic smokers and tobacco chewers as compared to 26% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means smoking and chewing affects the sperm count significantly in our study. 30% of the cases with low sperm count were chronic alcoholics as compared to 14% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means smoking and chewing affects the sperm count significantly in our study.

Table 8: Factors affecting the sperm motility

	Low motility		Normal motility		p value
	No	%	No	%	
Chronically addicted	26	52.0	20	33.3	0.001
Free from addiction	14	28.0	40	66.7	
Total	**50**	100.0	**60**	100.0	

52% of the cases with low sperm motility were chronically addicted as compared to 33.3% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means chronic addictions significantly affect the sperm motility.

Discussion

Total 100 semen samples were analysed, of which 50 were found to be abnormal in our study.

Majority of the cases were from 26-30 years age group i.e. 20 (40%) followed by 15(30%) from 31-35 years, 10(20%) from 21-25 years, and 5(10%) from 36-40 years age group. (Table 1) Singh K et al [12] in their study showed that age distribution as follows: < 20-22 (4.85%), 21 – 30 years in 312 (68.72%), 31 – 40 years- 106 (23.35%) and >40 years in 14 (3.08%). Kulkarni Sn et al [13] in their study reported that 53.6% of the patients with the age between 26-30 years.

Our findings revealed that 45% of the cases have oligoasthenozoospermia. 36% of the patient has oligozoospermia. 14% have azoospermia. 2% each have aspermia, cryopsermia and nacrospermia.

(Table 6) Kulkarni Sn et al [13] in their study reported that asthenozoospermia was reported in 39 (19.9 %) cases. Teratozoospermia (normal forms < 4 %) was detected in 17 (8.7%) cases. Multiple parameter defects were detected in 31 (14.1%) cases, Oligoasthenoteratozoospermia (OAT syndrome) in 7.3% of cases and Oligoasthenospermia in 6.8% of cases. In the present study of 220 infertile couple male factor was responsible in 96 (43.6%) cases as a cause of infertility. Our results agree with studies conducted by Joshi et al [14] Bhaduri et al [15] and Agu et al [16] who reported 11.0%, 12.42% and 14.2% respectively.

We observed that semen quantity was less than 1 cc in 8 patients i.e. 16%, less than 2 cc in 28 cases (56%), less than 3 cc in 8 cases i.e. 16% and more than 3 cc in 6 patients i.e. 12%. (Table 2) Kulkarni Sn et al [13] in their study reported that inadequate quantity of semen i.e. less than 1.5 ml was observed in 30 (13.6%) cases. Out of 220 cases, 124 (56.4%) cases were having normal semen parameters and in remaining 96 (43.6%) cases abnormalities in semen parameters were detected.

Bhaduri et al [15] found 7.45% of cases with less than 1.5 ml where as Jajoo and Kalyani reported 22% of cases with less than 2ml. [17]

We observed that 56% of the samples showed non motile sperms in our study. This is followed by 24% cases with sluggishly motile sperms and remaining 20% with actively motile sperms in our study. We observed that almost 16% of the cases the sperm motility was less than 50%. In 24% of the cases the motility was between 20-50% and in majority of the cases that is 60% patients having sperm motility of is than 20%. (Table 3 & 4)

42% of the cases with low sperm count were chronic smokers and tobacco chewers as compared to 26% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means smoking and chewing affects the sperm count significantly in our study. 30% of the cases with low sperm count were chronic alcoholics as compared to 14% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means smoking and chewing affects the sperm count significantly in our study. 52% of the cases with low sperm motility were chronically addicted as compared to 33.3% cases with normal sperm count showing statistically significant difference between two groups ($p<0.05$). It means chronic addictions significantly affect the sperm motility. (Table 7 and 8)

Okonofua FE et al [18], Barak S. et al [19], Barratt CL et al [20], Fainberg J et al [21] also stated in their study findings that the behavioural risk factors associated with male infertility included smoking, alcohol intake, inappropriate body mass index, sexual behaviour, and exposure to drugs.

Conclusion:

Abnormal sperm count was observed in 50% of the cases in our study. Sperm density was less than 10 million per ml in 16% of the cases. More than half number that is 56% were non motile sperm. Majority of the cases having oligoasthenozoospermia that is 45%. We also observed chronic smoking and alcoholism as the important risk factors for low semen count and sperm motility in our study.

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