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A STUDY OF MALE INFERTILITY BY SEMEN ANALYSIS IN ANIIMS PORT BLAIR, ANADAMAN AND NICOBAR ISLANDS

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ABSTRACT

Background: Infertility is social stigma. Varying habits among males that is smoking and alcohol intake have found negative influence on sperm count and motility. **Objecctives:** To evaluate various factors for male infertility and correlate various factors which affect the semen quality. **Materials and Methods:** This is prospective observational study in which total 100 cases of infertility were evaluated during the period of May 2020 to June 2021 in ANIIMS, Port blair. The results of alcoholics, and smokers were studied and compared to that of non-alcoholics and non-smokers. **Result:** 48% of the patients belongs to age group of 26-30yrs, who came for semen analysis. we have found that majority of patients belonged to the group of middle class and lower middle class. 75 out of 100 cases (75%) had semen volume more than 1.5ml. WHO regards 1.5 ml as the lowest reference limit. 84% patients had sperm density >20 milllion/ml. Actively motile sperm was seen in 20% of patients. Sluggishly motile sperm was seen in 25% of patients and non motile sperm seen in 55% patients. Frequency of motile sperm shows that 60% of patients had <20% motile sperm. 35% of patients had oligozoospermia, 42% patients had oligoazoospermia and 17% of patients had azoospermia. > 50 % of patients had pus cells >10/HPF. Total 58 (58%) patients were having smoking habit, while 42 (42%) were nonsmokers. 21 out of 42 nonsmoker had good sperm motility i.e. >50% motile sperm. Only 17 out of 58 smoker had >50% motility while 12 had motility of <5%. Within the alcoholic subgroups, teratozoospermia dominated in alcoholics [32(32%)] than the nonalcoholic [15(15%)] cases. Similarly, oligozoospermia was present in as high in alcoholics [16 (16 %)] than in nonalcoholic cases [16(16%)]. 12 out of 30 obese patients had sperm motility < 5%. While 5 out of 35 overweight and 2 out of 34 normal weight patients had sperm motility <5%. Good motility (>50%) seen in normal weight patients [20 out of 34 (58.8%)]. **Conclusion:** Smoking and alcohol decrease fertility by decreasing sperm count, motility and also by changing the morphology of sperm. Obesity also directly contributes in the fertility of a person by altering the hormonal status of patients.

KEYWORDS: Semen analysis, Smoking, Alcohol, Obesity, male Infertility.

INTRODUCTION

Infertility is defined as the inability of a couple to achieve conception during one year of marriage, globally affecting approximately 10-15% of couples.[1] Infertility can either be primary or secondary; primary male infertility is when the man has never impregnated a woman, while secondary male infertility is when a man has impregnated a woman irrespective of the outcome of the pregnancy.[2] Men with secondary infertility, in general, have better chance of future fertility.[2]

In 1667 for the first time, Leuwenhoek examined his own semen ejaculate under the microscope to see live human sperm cells in a drop of semen.[1] Since centuries, the female partner was generally blamed for infertility but, the Greeks were aware of male infertility. Various causes are attributed for infertility and it is proved that infertility is due to many factors, in both males and females.[3]

It was reported that 40% of infertility cases were related to men, 40% women and 20% both sexes. According to a multicentric study conducted by WHO from 1982 to 1985, 20% of cases were attributed to male factors, 27% had causal factors identified in both the partners. In Indian couples seeking treatment, the male factor is the cause of approximately 23%. A recent report on the status of infertility in India states that nearly 50% of infertility is related to the reproductive anomalies or disorders in male. In addition, overall 25% of infertility cases, no detectable cause can be traced after routine tests, which leaves the case as unexplained infertility. The aetiological factors associated with male infertility are anatomical, developmental, seminal, hormonal, immunological and environmental factors.[4]

Semen analysis is the primary assessment tool to evaluate potential male infertility. It is still a fundamental step for exploring testicular function and gives an orientation to the clinician and helps him establish a diagnosis. Moreover, after a treatment it can be one of the monitoring tools to show if there's any improvement or not.

The objective of the study was to evaluate various factors for male infertility and correlate various factors which affect the semen quality.

MATERIALS AND METHODS

Type of study: This is prospective observational study in which total 100 cases of infertility were evaluated during the period of May 2020 to June 2021 in ANIIMS, Port blair.

Sample Size: 100.

Requirement for collection: sterile container.

Inclusion and Exclusion criteria
Male patients referred to pathology laboratory for semen analysis were included in the study. There were no exclusion criteria.

Detailed clinical history including presenting complaints of patient, age, occupation, marital history, relevant family & past history was taken.

After explaining to patient semen was collected after 3 days of abstinence. The sample was received in laboratory within 30 min of collection. Entire sample were obtained by masturbation in clean wide mouth plastic container provided by laboratory. Container was labelled with patient name, registration number, time & date of collection.

Physical examination of semen sample
Volume, colour, viscosity, pH : noted.

Liquefaction time
Normal viscosity: small discrete drop.
Abnormal viscosity: drop from thread >2cm.
pH: pH paper was diped in samp and pH in indicator strip was checked.

Microscopic Examination
After physical examination, wet preparation for sperm motility was carried out. Sperm count in percentage with the help of neubauer counter chamber and stained with pap stain to check for the morphology of thr sperms.

Method for sperm motility
1. A drop of semen was placed on glass slide & covered with a coverslip.
2. Was examined under high power(40x).
3. A total 100 spermatozoa was counted, and out of the hundred how many are motile were noted. Percentage that are motile and non motile were noted.

Method of Sperm count
1. Semen was diluted 1:20 with sodium bicarbonate-formalin diluting fluid. (0.1 ml semen and 1.9 ml formalin)
2. Neubauer chamber was charged with diluted semen sample.
3. Sample was allowed to settle for 10 to 15 minutes.
4. The chamber was placed under the microscope and spermatozoa were counted in 4 large corners squares using the 40x objectives
5. Sperm count per ml was calculated as follows:

$$\text{Sperm count} = \frac{\text{Sperms counted (N) X correction factor for dilution (20)}}{\text{Numbers of squares counted (4) X volume of one square (0.1)}} \text{ X } 1000$$

$$= \text{N X } 50{,}000$$

Smear examination for sperm morphology
1. A drop of semen on a glass was placed and slide was prepared
2. Stained the smear with field stain.
3. At least 200 spermatozoawas counted under oil immersion.
4. Percentage of normal & abnormal spermatozoa was recorded.

RESULTS

Total 100 patients of infertility had been taken for a period of one year in Dept. of Pathology.

Table 1: Age distribution of men who came for routine semen analyses.

Age (years)	No of cases	No. %
21-25	6	6
26-30	48	48
31-35	31	31
36-40	12	12
41-50	2	2
46-50	1	1
Total	100	100

As per above Table 1, 48% of the patients belongs to age group of 26-30yrs.

Table 2: Occupation wise distribution of all infertile patients.

Occupation	No. of patients	Percentage
Laborers	13	13%
Vendor	8	8%
Shopkeeper	8	8%
Driver	9	9%
White collar employee	8	8%
Others	54	54%
Total	**100**	**100%**

As per Table 2, we have found that majority of patients belonged to the group of middle class and lower middle class.

Table 3: Semen data parameter.
Volume status of men who came for routine semen analysis w.r.t 1.5 ml cut off of semen volume

Volume(ml)	< 1.5 ml	> 1.5 ml	Total
No. of cases	25	75	100
Percentage (%)	25%	75%	100%

Table 3 shows that 75 out of 100 cases (75%) had semen volume more than 1.5ml. WHO regards 1.5 ml as the lowest reference limit.

Table 4: Semen data parameter.
Sperm density

Sperm Density (million/ml)	No. of patients	Percentage
>20	84	84%
10.1 - 20	12	12%
<10	4	4%
Total	**100**	**100%**

As per Table 4. 84% patients had sperm density >20 milllion/ml.

Table 5: Semen data parameter.
Sperm motility

Sperm motility	No. of patients	Percentage
Actively motile	20	20%
Sluggishly motile	25	25%
Non motile	55	55%
Total	**100**	**100%**

Table 5 shows actively motile sperm was seen in 20% of patients. Sluggishly motile sperm was seen in 25% of patients and non motile sperm seen in 55% patients.

Table 6: Semen data parameter.
Frequency of motile sperm

Sperm motility	No. of patients	Percentage
>50	16	16%
20.1-50	24	24%
5-20	60	60%
Total	**100**	**100%**

Frequency of motile sperm shows that 60% of patients had <20% motile sperm.

Table 7: Semen data parameter.
Abnormality

Sperm Abnormality	No. of patients	Percentage
Oligozoospermia	**35**	**35%**
Oligoasthenozoospermia	42	42%
Azoospermia	17	17%
Aspermia	2	2%
Cryptospermia	**2**	**2%**
Nacrospermia	**2**	**2%**

35% of patients had oligozoospermia, 42% patients had oligoazoospermia and 17% of patients had azoospermia.

Table 8 Semen data parameter.
Pus cell/HPF

Pus cell/HPF	No. of patients	Percentage
>10	52	52%
4-10	35	35%
2-3	13	13%
Total	**100**	**100%**

> 50 % of patients had pus cells >10/HPF.

Table 9: Motility of sperm in relation to smoking.

Sperm motility	Smoker				Non-Smoker	Total
	Mild	Moderate	Sever	Total		
>50%	8	6	3	17	21	38
20-40%	6	11	1	18	6	24
5-19%	1	4	6	11	8	19
<5%	2	4	6	12	7	19
Total	17	25	16	58	42	100

Table 10: Count of morphologically normal sperm in relation to smoking.

Sperm morphology (Normal Sperm)	Smoker				Non-Smoker	Total
	Light	Moderate	Heavy	Total		
>30%	9	6	1	16	7	23
20-30%	3	5	2	10	12	22
10-19%	3	4	1	8	10	18
3-9%	1	5	3	9	7	16
<3%	4	5	6	15	6	21
Total	20	25	13	58	42	100

Table 9 and 10 shows the motility and morphology of sperm in relation to smoking habit of the patients. Total 58 (58%) patients were having smoking habit. While 42 (42%) were nonsmokers. 21 out of 42 nonsmoker had good sperm motility i.e. >50% motile sperm. Only 17 out of 58 smoker had >50% motility while 12 had motility of <5%.

Table 11: Alcohol Consumption In Relation To Sperm Morphology.

Sperm Morrphology (Normal Sperm)	Alcoholic				Non-alcoholic	Total
	Mild	Moderate	Heavy	Total		
N	5	1	1	7	16	23
A	3	1	0	4	4	8
A+O	2	1	2	5	4	9
A+T	2	3	2	7	4	11
A+O+T	3	4	4	11	3	14
O	2	3	3	8	5	13
O+T	2	2	1	5	4	9
T	3	3	3	9	4	13
Total	22	18	16	56	44	100

N=Normozoospermia, A=Asthenozoospermia,
O=Oligozoospermia, T=Teratozoospermia
Mild alcohol: those consuming 40g or less;
Moderate alcohol: consuming 40-80g;
Heavy alcohol: consuming more than 80g per day.

Table 11 shows the sperm morphology in comparison to alcohol consumption of the patients. Within the alcoholic subgroups, teratozoospermia dominated in alcoholics [32(32%)] than the nonalcoholic [15(15%)] cases.

Similarly oligozoospermia was present in as high in alcoholics [16 (16 %)] than in nonalcoholic cases [16(16%)].

All three abnormality like teratozoospermia, asthenozoospermia and oligozoospermia seen in 11 patients of alcoholic group while 3 patients of nonalcoholic group.

Table 10: Correlation of Obesity and Sperm Motility.

Sperm motility	Normal (BMI =20-24kg/m2)	Overweight (BMI=25-30Kg/m2)	Obese (>30kg/m2)
>50%	20	15	5
20-40%	7	10	6
5-19%	5	5	7
<5%	2	5	12
Total	34	35	30

12 out of 30 obese patients had sperm motility < 5%. While 5 out of 35 overweight and 2 out of 34 normal weight patients had sperm motility <5%. Good motility (>50%) seen in normal weight patients [20 out of 34 (58.8%)].

DISCUSSION

Semen analysis is a very important investigation and should be done thoroughly in male partner of each infertile couple. In present study total 100 numbers of infertile patients were studied for the full semen analysis and correlation with epidemiological and other factors.

In present study, the age group of presentation was 21 to 40 years with commonest age group was 26 – 30 years (mean age 28 years). Other study by Saxena SC[5] found the similar type of result with mean age of 30.68 years.

In present study, the mean of semen quantity was 1.5 ml. Saxena[5] reported a mean of 2.0 c.c. Osegbe and Amaku[6] reported semen volume ranging from 0.4 to 10 ml, with a mean of 2.56 c.c. Mclane[7] suggested homologous insemination be performed if semen volume is 1.5 ml or less. In this series, there were 25 patient (25%) who had semen quantity less than 1.5 ml. The sperm density in present study is compared with study by McLeod and Gold etal.[8], Saxena et al.[5], and Zukerman et al.[9]

Authors	Sperm density(millions/ml)		
	<10	10.1 – 20	>20
Present study	4%	12%	84%
McLeod and Gold et al (1951)[8]	9%	5%	86%
Saxena et al. (1972)[5]	33.1%	2%	64.9%
Zukerman et al. (1977)[9]	28%	14%	58%

It was found that 16.6% of non-smokers showed below 5% sperm motility and 20.6 % of smokers showed below 5% sperm motility. Among the 3 groups of smokers, sperm motility below 5% was present in 11.7% of light smokers, 16% of moderate smokers, and 37.5% of heavy smokers. In similar result were obtained by Zhang et al. in 2000.[10]

The sperm morphology was normal below 3 % in 14 % of non-smokers while 25% of smokers. Among the 3 groups of smokers, morphology of sperm, less than 3% of normal sperm cells were present in 20 % of light, 20% of moderate, and 46 % of heavy smokers.

Thus, the highest abnormal sperms are present in heavy smokers and it also suggests that as the amount of smoking increases, it also increases the number of abnormal sperms. This is also supported by Zukerman et al.[9] In 21% nonsmoker showed below 3% normal sperm morphology and 69% in smoker.

7 patients of alcoholics showed normozoospermia, of which 5 were mild alcoholics and 1 was heavy alcoholics. 16 cases of non-alcoholic showed normozoospermia. This study was comparable to previous study of Villalta J.[11] showed in 15% in heavy smoker and 72% in non-alcoholic cases.

In present study 34 patients (34%) were normal weight, 35 (35%) overweight and 30 (30%) obese patient. < 5% Sperm motility is noted in 12 (40%) in obese patient while only 2 (5.8 %) Normal weight patient. In the present study > 50% sperm motility was noted in 5(16 %) obese patient. Korte et al.[10] concluded that men with high BMI values (>25) present with only few normal-motile sperm cells.

Pus cells > 4 in number in semen sample are an indicative of infection in the male reproductive tract. Normally up to 1-2 pus cells/HPF are present in semen sample. 35 (35%) patients had pus cells count ranging between 4-10 pus cells/HPFindicating moderate infection. There were 52 (52%) patients who had more than 10 pus cells/HPF indicating severe infection. Saxena[5] reported 20% cases with severe infections.

CONCLUSION

In conclusion smoking and alcohol decrease fertility by decreasing sperm count, motility and also by changing the morphology of sperm. Obesity also directly contributing the fertility by altering the hormonal status of patients. Presence of pus cells suggests infective etiology.

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