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Patterns of semen analysis in male partners of infertile couples at a tertiary care hospital

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Abstract

Introduction: Routine semen analysis remains the backbone in the evaluation of male factor infertility, besides detailed medical history and thorough physical examination. Male factor is responsible in at least 50% of cases of failure to conceive.

Aims and Objectives: To evaluate the seminal patterns in male partners of infertile couples and to identify possible contribution of male factors to overall infertility problem.

Materials and Method: Ours is a retrospective study of all semen samples collected from 1st July 2015 to 30th June 2016. Various Seminal parameters were evaluated like volume, pH, liquefaction time, viscosity, pus cells, sperm count, motility and morphology according to WHO (World Health Organization) criteria.

Results: There were total 159 cases. The age ranged from 20yrs to 43yrs.The most common abnormalities found in our study were oligozoospermia and azoospermia.

Conclusion: Semen quality remains a significant contribution to overall infertility. Semen analysis is still a cornerstone laboratory evaluation and contributes to defining the possible male factor to a couple's infertility.

Keywords: Infertility, Semen analysis, Spermatozoa, Oligozoospermia

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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)] Our study was done to evaluate the seminal patterns in male partners of infertile couples and to identify possible contribution male factors to overall infertility problem.

Materials and Method

Ours is a retrospective study of the seminal fluid indices of consecutively consenting male partners of infertile couples seen at NRI medical college and Hospital from July 2015 to June 2016. WHO standards were used in the collection and processing of the samples. A total of 159 consenting male partners of infertile couple were included in the study. Sample collection was done by masturbation, following abstinence from ejaculation for 3-5 days. Samples were collected in our lab, into sterile screw capped plastic universal containers. Cases excluded from our study were persons who gave history of antibiotic usage and spilled sample during collection. Using WHO standards, semen analysis was carried out by determining semen liquefaction, volume, appearance, pH, sperm concentration, motility, morphology, and the presence of White Blood Cells (WBC) or Red Blood Cells(RBC). Analysis was done using Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics and chi- square test as a test of association were applied for analysis and interpretation of the result.

Results

A total of 159 male partners of infertile couples were investigated during our study period. The patients age ranged from 20 - 54yrs, with the mean age of the patients being 30yrs. The patients aged ≤30yrs were 98, whereas patients aged >30yrs were 61.

In our study, one or more abnormal seminal parameters were found in 83cases (52.2%). Abnormalities in sperm number was the most common abnormality observed in 63 cases(39.6%), followed by abnormalities in motility (asthenozoospermia) in 37 cases(23.2%)(Table 1).

Table 1: Seminal fluid abnormalities found in our study

Abnormalities	No. of cases
Abnormal sperm number	63
Abnormal sperm motility	37
Increased pus cells	18
Increased viscosity	12
Increased liquefaction time	8
Abnormal pH	1
Abnormal morphology	1

In relation to age, abnormal semen analysis was found in 42cases (42.8%) in patients aged ≤30yrs, whereas abnormal semen analysis was found in 28cases (46%) in patients aged >30yrs.

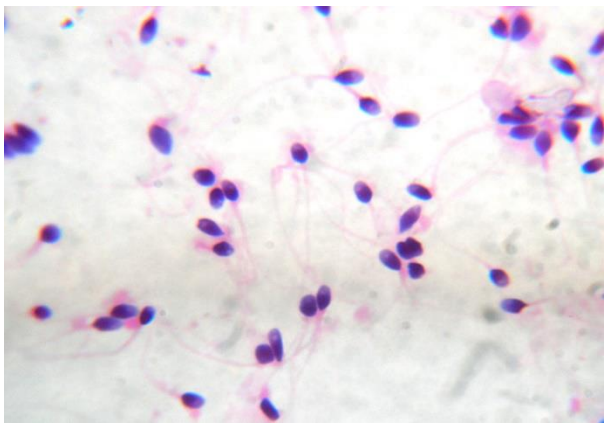

Fig. 1: Normal sperm morphology

Abnormalities in sperm count included 51cases (32%) of oligozoospermia, 12 cases (7.5%) of azoospermia. Normozoospermia was identified in 96cases (60.3%) (Table 2).

Table 2: Sperm count

Sperm count	(n = 159)
Oligozoospermia	51
Azoospermia	12
Normozoospermia	96

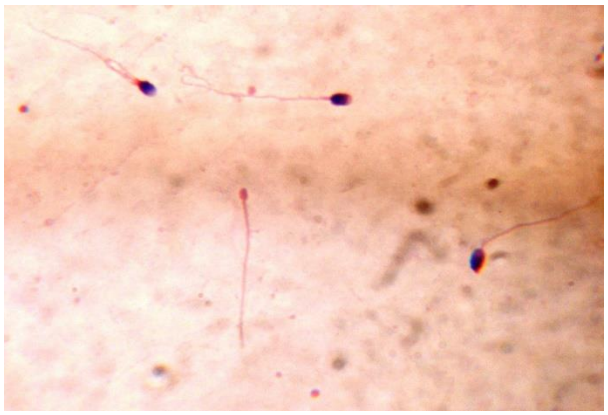

Fig. 2: Spermatozoa with pin head

Sperm motility was within WHO reference range in 110 cases (69.2%) and below WHO reference range in 37 cases (24.5%). Among these 37cases, progressive motility (PR) below lower reference range was identified in 12 cases (8%), whereas total motility (TR) below lower reference range was identified in 26 cases (17.4%).

The distribution of motility was studied in relation to sperm concentration and abnormal motility was found in 30 (81.6%) oligozoospermic males, whereas normal motility was found in 21 (14.7%) cases (Table 3). In normozoospermic males, abnormal motility was found in 7 (18.4%) cases, whereas normal motility was found in 89 (85.3%) cases.

Table 3: Distribution of sperm motility in relation to sperm concentration

Sperm concentration	Normal motility	Abnormal motility
Oligozoospermia	21(14.7%)	30 (81.6%)
Normozoospermia	89 (85.3%)	7 (18.4%)

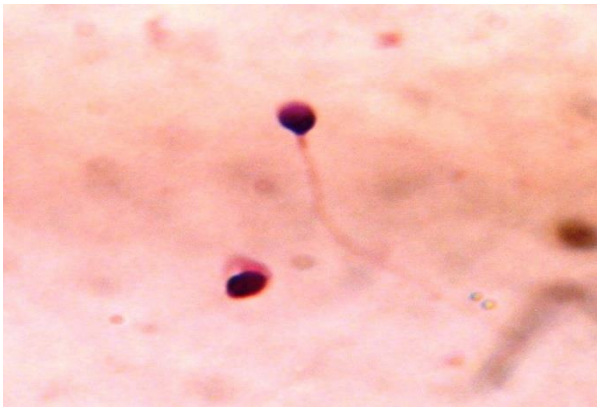

Fig. 3: Spermatozoa with short tail

Major seminal parameters like sperm count, sperm motility and sperm morphology were studied. Oligoasthenozoospermia was the most common abnormality identified in 29cases (18.2%), followed by oligozoospermia in 21cases (13.3%), azoospermia in 12 cases(7.5%), asthenozoospermia in 7cases (4.4%), oligoteratoasthenozoospermia in 1case(0.7%). Normal sperm morphology <4% was found in only 1 case in our study(Fig. 1). The abnormalities found in our study were round heads, pin heads, bent neck, short tail, long tail, double head (Fig. 2, 3, 4, 5)

Table 4: Distribution of various abnormalities in major seminal parameters

	Number (n=159)	Percent
Normospermia	89	55.9%
Oligoasthenozoospermia	29	18.2%
Oligozoospermia	21	13.3%
Azoospermia	12	7.5%
Asthenozoospermia	7	4.4%
Oligoteratoasthenozoospermia	1	0.7%

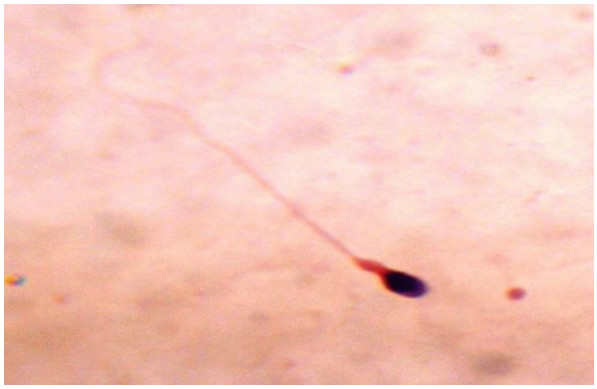

Fig. 4: Spermatozoa with thick mid piece and long tail

Among minor seminal parameters, seminal fluid volume was 2-5ml in all the cases.

Pus cells were >5cells/HPF in 18cases (11.3%), <5 cells/HPF in 141cases (88.7%).

Increased viscosity (>2cm length) was seen in 12 cases (7.5%). It was associated with abnormal seminal parameters in 6cases (3.7%) and with normal seminal parameters in 6cases (3.7%).

Increased liquefaction time (>1hr) was observed in 8cases (5%). It was associated with abnormal seminal parameters in 5cases(3.1%) and normal seminal parameters in 3 cases (1.8%)pH was in the range of 7.5 to 8.5 in all cases except one case in which the pH was 6.9.

Among smokers, abnormal semen analysis was found in 38cases (63.3%), normal semen analysis was found in 20cases (36.6%). among alcoholics, abnormal semen analysis was found in 42cases (56%) and normal semen analysis in 33cases (44%).

Discussion

WHO has set lower reference limits for various seminal parameters[4] (Table 5). Although the reference ranges are useful for epidemiological studies relating to men's health, it is dangerous to assume that they indicate either fertility or infertility except when they are at the extremes of the range.[5] If the results of semen analysis are normal according to WHO criteria, one test is sufficient. If the results are abnormal in at least two tests, further andrological investigations are indicated.

Table 5: WHO lower reference limits for semen characteristics

Parameter	Lower reference limit
Semen volume (ml)	1.5 (1.4 - 1.7)
Total sperm number (10^6 per ejaculate)	39 (33 - 46)
Sperm concentration (10^6 per ml)	15 (12 - 16)
Progressive motility (PR, %)	32 (31 - 34)
Total motility (PR+NP, %)	40 (38 - 42)
Sperm morphology (normal forms, %)	4 (3.0 - 4.0)
Vitality (live spermatozoa, %)	58 (55 - 63)
PH	7.2

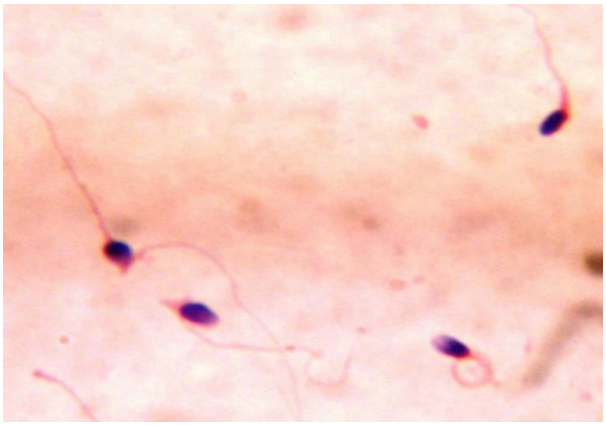

Fig. 5: Spermatozoa with bent neck and coiled tail

As high as 90% male infertility problems are related to count and there is positive association between abnormal semen parameters and sperm count.[6] There is positive correlation between sperm count and pregnancy.[7] The diagnosis of azoospermia is very important, as even a few dozen spermatozoa can be used in an IVF/ ICSI cycle. It also obviates the need for surgical sperm search.

The extent of progressive sperm motility is related to pregnancy rates. It is an important prognostic fertility factor specifically, when the proportion of motile spermatozoa is below 40%. Any method that disregards the quality of the progressive motility is not suitable for studies related to fertility.[8]

Cigarette smoking has detrimental effects on spermatogenesis and they thereby impair fertility.[6] Excessive alcohol consumption has been associated with poor reproductive function including ejaculatory dysfunction.[6]

In our study one or more abnormal seminal parameters were found in 83cases (52.2%), which is in correlation with study by Jajoo. S et al (52%).[9]

Abnormal seminal parameters were studied in comparison to age and the results of our study were comparable to that of Jajoo S et al.[9] In our study, abnormal semen analysis was found in 46.9% in patients aged ≤30yrs and 50.8% in patients aged

>30yrs. Jajoo S et al[9] observed abnormal semen analysis in 48% of patients aged ≤30yrs and 52% in patients aged >30yrs.

The most common abnormality in our study was abnormal sperm count, found in 63cases (39.6%) followed by sperm motility below reference range in 37 cases (23.3%).

Major seminal parameters like sperm count, motility were studied and our results showed higher number of oligozoospermic cases and asthenozoospermic cases compared to Samal et al[6] Kalavathi et al.[10] Oligozoospermia was observed in 32.1% of cases in our study, whereas Samal et al[6] observed in 29.13% and Kalavathi et al[10] in 24.8% cases. Azoospermia was found in (6.75%) in our study. Samal et al[9] observed azoospermia in 29.13%, whereas Kalavathi et al[10] in 8.4% of their study (Table 6).

Table 6: Abnormalities in number and motility compared to other studies

	Our study 2016 (n=159)	Samal et al 2012 (n=3000)	Kalavathi 2016 (n=250)
Normozoospermia	55.9%	61.98%	65.6%
Oligozoospermia	32.1%	29.13%	24.8%
Azoospermia	7.5%	6.75%	8.4%
Asthenozoospermia	23.2%	1.45%	1.2%

Progressive motility is defined as spermatozoa moving actively, either linearly or in a large circle, regardless of speed. Non-progressive motility (NP) is defined as all other patterns of motility with an absence of progression. Total motility includes progressive motility and non-progressive motility.[4] Asthenozoospermia was found in 23.2% of cases in our study, 1.45% cases by Samal et al[6] and 1.2%cases by Kalavathi et al.[10] Our study showed motility below lower reference range in 37 cases, whereas it is observed in 1.45% cases in study by Samal et al[6] and 1.2% cases by Kalavathi et al.[10]

Sperm count was studied in comparison to sperm motility and our study (81.6%) showed higher number of abnormal sperm motility in oligozoospermic males, compared to Fauzia Butt et al[11] (62%).

Compared to Jajoo et al[9] (40.05%) and Kalavathi et al[10] (58.6%), our study (63.3%) showed higher percent of abnormal seminal parameters among smokers.

Abnormal semen analysis in alcoholics was higher in our study (56%), compared to Jajoo et al[9] (29.7%), but lower compared to Kalavathi et al[10](74.3%).

Conclusion

Our study demonstrated abnormal seminal parameters in 52.2% of infertile males. Statistically significant difference in abnormal semen analysis was not found in age group ≤ 30yrs and >30yrs. Most common abnormality found in our study was oligozoospermia. Abnormal motility was seen more in oligozoospermic males compared to normozoospermic males. Abnormal semen analysis was found to be higher in smokers and alcoholics compared to normal individuals.

Measurements of sperm concentration, motility, and morphology provide useful information for diagnosing male infertility.

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