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Original Research Paper

Clinical Laboratory

ROLE OF SEMEN ANALYSIS IN MALE INFERTILITY

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ABSTRACT

Background: Infertility is social stigma. It remains both prevalent and problematic among couples worldwide. Male infertility also has significant contribution in Toto. The analysis of semen remains the preliminary and standard investigation for evaluating male fertility in couples.

Aim: To assess and analyse the semen characteristics of all the males who presented to our laboratory centre, irrespective of primary or secondary infertility.

Material And Methods: This is an observational study conducted in the Tertiary laboratory centre,Bhopal from Jan 2019 to dec 2019. The study population comprised of 106 male patients referred to the laboratory for semen analysis and results were analysed.

Results: The present study included 106 subjects whose age ranged from 20 - 49 years with a mean age of 29.8 years. Patients were divided into oligospermia[9.4%], normospermia[84%] and azoospermia[6.6%]. after excluding 7 cases of azoospermia, 79.8 % of the cases were above the reference motility and all these cases had > 32% of sperms with progressive movement.

Conclusions: Semen analysis remains as a significant contribution in the overall diagnosis of male infertility. Males contribute towards infertility in couples significantly and further study and aasessment is required to accurately predict the importance of this.

KEYWORDS : Infertility, sperm count, azoospermia, oligospermia

INTRODUCTION

Infertility is defined as failure of a couple to conceive after one year of regular sexual intercourse. It represents a significant social, medical & economic burden for individual and the society . It effects on an average 25% couples worldwide.

In India also infertility is a common and distressing problem, usually infertile couples report late for evaluation . Formerly, females alone shouldered the responsibility for infertility. Today, however, it is realized that the male is equally likely to be affected as his mate. In humans male infertility accounts for 40–50% of infertility.[1][2] More than 90% of male factor infertility is characterized by low number of sperm in semen or production of spermatozoa in poor quality[3]. Approximately 10% of infertile men are azoospermic.

semen analysis one of the first steps to detect male fertility issues. The test also shows whether a vasectomy was successful. It is a simple test that assesses the formation and maturity of sperm as well as it provides insight not only on sperm production (count), but sperm quality (motility, morphology) as well.[4] Abnormal sperm morphology and insufficient sperm motility remains a significant contributor to overall infertility.[5] The average sperm count today is between 20 and 40 million per milliliter in the Western world, having decreased by 1-2% per year from a substantially higher number decades ago[6].

In our society males are hesitant to undergo counselling or tests, In this scenario semen analysis is an easy non invasive test which provides baseline information and a prelude to further investigations. It is appropriate to obtain a semen analysis early in working with an infertile couple. It is not acceptable to put a woman through various medical procedures and tests without knowing the status of her partner's semen .7 The present study is an attempt to assess and analyse the semen characteristics of all the males who presented to laboratory centre, irrespective of primary or secondary infertility.

MATERIAL AND METHODS:

This is an observational study conducted in the Tertiary laboratory centre ,Bhopal from Jan 2019 to dec 2019. The study population comprised of 106 male patients referred to the laboratory for semen analysis. These patients were prepared for semen analysis and following instructions were given to get the best sample

- avoid ejaculation for 24 to 72 hours before the test
- avoid alcohol, caffeine, and drugs such as cocaine and marijuana two to five days before the test
- avoid any hormone medications

After providing proper instructions to the person, Samples were collected after a minimum of 48 hours but no longer than 5 days of sexual abstinence. Increased sperm concentration is associated with prolonged abstinence while improved motility is associated with shorter period of abstinence but with lower sperm density.

Semen assessment was performed as soon as the samples were liquefied but within 1 hour of collection. Seminal volume was measured and sperm count was done in the Improved Neubauer counting chamber after an appropriate dilution. The cases with nil sperms were re-evaluated on three occasions before labeling them as azoospermia. Sperm motility was assessed by direct visualization under the microscope.

RESULTS

The present study included 106 subjects whose age ranged from 20 years to 49 years. The maximum number of cases were in the age range 20-30 years accounting for 66.1%(n=70)of the cases, (Figure I) The mean age of 29.8years.32 and 4 cases were seen in the 30-40 years and 40-50years age group.

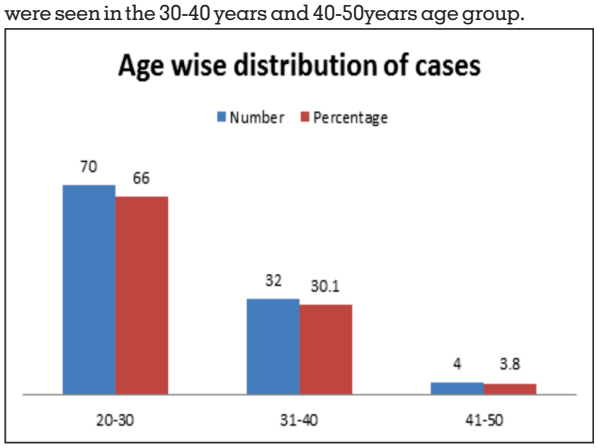

Fig.1 Age Wise Distribution Of Cases

As pet the latest WHO recommendations,1.5ml or more was taken as normal volume. Out of the 106 subjects in the current study, 8 individuals (7.5%) had an ejaculate volume less than 1.5 ml and 98 individuals (92.5 %) had an ejaculate volume of 1.5 ml and above(Table 1).

Table 1: Distribution Of Cases According To Volume Of Semen (n=106)

Volume of Semen (in ml)	Number of males(%)
< 1.0	3 (2.8%)
1.0- 1.4	5 (4.7%)
1.5- 1.9	20 (18.9%)
2.0 or >2.0	78 (73.6%)

The sperm counts in the present study ranged from 0-100 million per ml ,out of this 9.4 % (10) of the cases had a sperm concentration of less than 15 million/ml and a total of 84.0% of the analysed population was in the normal range. Azoospermia, that is no sperms in the ejaculate, was seen in 7 (6.6%) individuals(Figure 2).

Oligospermia were cases with counts less than 15 million/ml, Normospermia were those with sperm counts above 15million/ml while azoospermia had no sperms.

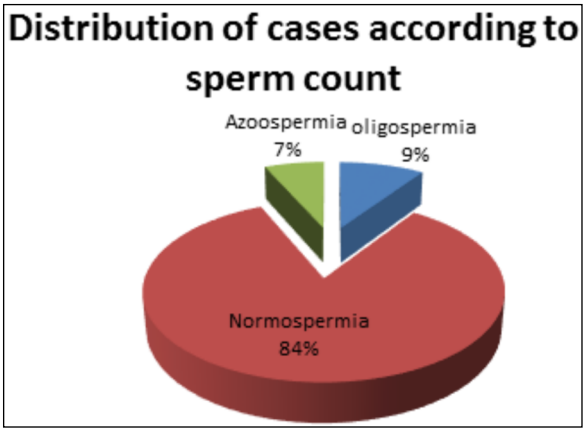

Fig 2. Distribution Of Cases According To Sperm Count

On exclusion of the 7 azoospermic cases, the 99 subjects left were distributed according to the range of sperm count as depicted in the Table 2.

Table 2: Distribution Of Cases According To Sperm Count (In Millions, n=99)

Sperm count (in millions/ml)	Number of males (%)
0-14	10 (10.1%)
15-20	8 (8.1%)
21-50	24 (24.2%)
51-80	37 (37.3%)
81-100	20 (20.2%)

Besides sperm concentration, sperm motility is also an important parameter and determinant of male fertility. It is important to realize that sperm motility should be analysed as early as possible and must be measured within 60 minutes of collection. According to the latest WHO criteria[7]a total sperm motility of 40% with progressive movement of >32% is taken as cut off value , individuals above this are taken to be normal. In the present study, after excluding 7 cases of azoospermia, 79.8 % of the cases were above the reference motility and all these cases had > 32% of sperms with progressive movement (table 3)

Table 3: Distribution Of Cases On The Basis Of Total Motility (n=99)

Total Motility	No. of Cases
>40%	79 (79.8 %)
<40%	20 (20.2 %)

20.2 % of the cases were less motile i.e motility <40% (asthenospermia) .Three cases out of the 20 cases in our study had 100% dead sperms at the time of evaluation.

DISCUSSION:

Semen analysis is an extremely common, yet most under interpreted test carried out in evaluation of infertility of a couple. In spite of reservations in the society, the test is being used widely and is often the first and in most instances the only test for males. In our society, females have often been the target of society for infertility, however, advancing knowledge and development of assisted reproductive techniques have proven males to be an equal contributor to this problem.

Our study was an observational study with a population of 106 individuals having a mean age of 29.8 years with a maximum number of cases were in the age range 20-30 years. A relatively higher mean age of 36.8years and 34 years has been reported by other authors.[8],[9] However, a mean age of 30years in concordance with our finding was observed by Jajoo S. et al.[10] and mean age of 29.42 years was observed by *Jairajpuri ZS et. Al.[11].* Male fertility usually peaks at around 35 years of age and declines after 45 years of age.[12] The changes associated with aging are moderate, but significant, although the capacity to fertilize is maintained.[13]

Precise measurement of volume is essential in any semen analysis as it allows the total count of spermatozoa and non sperm cells in the ejaculate to be assessed. Seminal volume reflects abnormalities in seminal vesicle fluid synthesis. Low semen volume is characteristic of obstruction of the ejaculatory tract or congenital absence of the vas deferens, however low semen volume can also result due to problems in collection.7 High semen volume may on the other hand reflect exudation in cases of active inflammation of accessory organs.[14]

According to the latest WHO recommendations, the lower reference value for semen volume is 1.5ml,[14] with reference to this 7.5 % of our study population had low volume while the remaining was within the normal range.

Sperm concentration is often proposed to be predictor of fertility potential. In recent years there have been reports of declining sperm concentration in men around the world.9 The new WHO 2010 guidelines has taken lower reference limit of 15 million/ml with values above these taken as normal.[14]

In the present study Oligospermia (sperm counts <15 million/ml) was seen in 9% of the cases which is near to value of 11.11% observed by Butt et al[15] while higher rates of 23.2%[16], 32%[17] and 25.6%[18] are also reported. It has been suggested by authors that low sperm counts are among the most common cause of male infertility.[5],[16]

Azoospermia, defined as absence of sperms in the ejaculation was seen in 7% of the cases which was lower compared to those seen in other studies such as 9%[11] 14.8%[15], 12.3%,[19]28.6%[20] . The problem of azoospermia is thought to be associated with sperm production or sperm transport. 15 . 84% of the analyzed subjects had normal sperm counts, in concordance with 73.9% reported by Butt et.al. [15] sand 74% in *Jairajpuri ZS et. Al..[11]* however these values are much higher than other reports such as 20%[19], 36.7%[5] and 51.8%[19]. More so, it may be noted that normal semen counts are a common event in infertile males, where the cause may be other factors such as immune related and marked biological variation.[21]

Assessment of sperm motility is essential as the spermatozoa

have to travel in the female genital tract to fertilize the oocyte, a requisite of normal pregnancy. 15 It is a critical parameter which indicates semen quality and fertility potential. As per the WHO 2010 recommendations, samples having 40% motile sperms with 32% showing progressive motility are considered normal.[14] In previous editions the total progressive motility for normal range was 50% and above; which included 25% with rapid progressive motility.

In the present study 79.8% of of the cases were above the reference motility and all these cases had > 32% of sperms with progressive movement. This was in concordance with 76%reported by Emma-Okon et.al[19] and 77.9% reported by Jairajpuri ZS et. Al. .[11] however a lower value of 62.02% has been noted by Alemnji.[8]

Asthenozoospermia (or "asthenospermia") is the medical term for reduced sperm motility. In this study 20.2% of our samples had asthenospermia similar to 22.1% of Jairajpuri ZS et. Al [11]; 24%[19] 25%[15]and a higher value of 35.2% [16]reported by other authors. Complete asthenozoospermia, a condition with 100% immotile spermatozoa in the ejaculate is reported at a frequency of 1 of 5000 men. [22] Three cases in our study had100% dead sperms at the time of evaluation. As stated earlier sperm motility is an essential requisite and a predictor of fertility, it comes with sperm maturation in their passage through the epididymis. Motility is also a determinant of how efficiently the sperms penetrate the cervical mucus during transport through the female genital tract, and penetration of oocyte during fertilization.

CONCLUSION:

It is concluded that the semen analysis of male partner should be one of the primary and essential investigation in infertile couples, but it is important to acknowledge the limitation of semen analysis with respect to collection, processing, evaluation, biological variation of the parameters and lack of information on sperm function. The semen parameters such as sperm concentration, motility, and morphology are known to be significantly related to the conception, however due to limitations as above, a normal semen analysis does not guarantee the fertilization potential of sperm. The present study represented a predominantly normal semen analysis of the study population. It was however limited due to small sample size and lack of comprehensive history. There is a need to undertake a study with amuch larger sample size complemented by adequate history and re-enforced conventional semen analysis to include more parameters besides sperm count, motility .Males contribute towards infertility in couples significantly and further study and aasessment is required to accurately predict the importance of this.

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