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A Study of Seminal Parameters in Infertile Men

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Abstract

Objective: To determine the prevalence of low sperm count (oligozoospermia) & azoospermia (absence of sperms) in seminal plasma infertile male & to assess the pattern & distribution of abnormal sperm parameters in infertile men. *Methods*: The descriptive cross-sectional study was carried out at the Department of Pathology R.D.Gardi Medical College, Ujjain from August 2016 to August 2017. A total of 100 consecutively consenting male partners of women fulfilling the inclusion criteria between 20 and 45 years of age were approached. Semen analysis was performed according to methods and standards defined by the World Health Organisation (WHO). Samples were categorised into normozoospermia, oligozoospermia and azoospermia on the basis of sperm count. *Results*: Out of the 120 males approached, 20 (20) had to be left out either because of their unwillingness or inability to pass semen. The study sample comprised of 100 response rate (83.33%) normozoospermia was observed in 47 (47%) males, azoospermia in 9 (9%), and oligozoospermia in 44(44%) The oligozoospermic samples had low ejaculated volume, but significantly higher percentage of non-motile sperms 62%(normal 33%) and abnormal morphology 43% (Normal 31%) in comparison to normozoospermic samples. *Conclusion*: Semen analysis is the basic diagnostic test that should be performed on all couples or singles that are suffering from infertility and or are concerned about having infertility. The purpose of the test is to detect possible abnormalities and/or "weaknesses "within the sperm. 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.

Keywords: Infertility; Semen; Sperm; Motility; Normozoospermia Oligozoospermia; Azoospermia; Asthenozoospermia; Teratozoospermia.

Introduction

Infertility: is a most frequently chronic international widespread health problem affecting young adult. It concern all social classes and races & affect 10% of married cohabiting women of 18-44 years of age.

Semen analysis remains the single most useful and fundamental investigation in the search for the cause

Male factor	35 %
Female factor	35 %
Both	20 %
Unexplained	10 %

of male infertility. Semen examination is advised in barren marriage, if women unable to conceive 1 year after unprotected sex below the age of 30 years & 6 months after the age of 35 years.The standard semen analysis have a sensitivity of 90.5% that it is able to detect 9 out of 10 men with a genuine problem.

The pathological causes for decreased sperm count arise from abnormality in the control mechanism of sperm production at pre-testicular, testicular or post testicular level.[3]In more than 90% of cases male infertility is due to either low sperm count or poor

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semen quality in relation to motility & increased number of morphologically abnormal spermatozoa or combination of the all. Recent data confirm the decline in semen quality and quantity all over the world probably due to increased prevalence of sexually transmitted diseases (STDs), urogenital infections, alcoholism, modern life style, alterations in food habits, poor diet, smoking, stress, underweight, obesity & drug addiction with cocaine and marijuana, age (sperm motility decreases after the man reaches the age of 45). Chemotherapy & radiation therapy in any form leads to asthenozoospermia & oligozoospermia. Episodes of high fever & prolonged exposure to heat in automobiles, saunas or hot tubs are other causes. A report in 1992 alarmed the world about the problem and led others to investigate the phenomenon.[4] There is substantial decrease in fertility index in whole of the world population. In our population where infertility is considered a female issue, and husbands are not willing to go for too many tests, screening by semen analysis provides us with a baseline before going for extensive, expensive, & time consuming investigations in counterpart female.

This cross-sectional study aimed at finding the prevalence of low sperm count & azoospermia in the population and abnormal semen parameters in semen.

Material & Methods

The present study was carried out in the Department of Pathology, R.D.Gardi, Medical College, Ujjain from August 2016 to August 2017. A total of 100 consecutively consenting male partners of women attending the OPD clinic between the ages of 20 and 45 years were recruited.

Detailed history was taken from the male partners regarding age, duration of marriage, occupation, sexual history, infertility (primary or secondary infertility), first or second marriage, drugs, surgical and medical history for any illness. The collection and analysis of semen were done by properly standardised procedures as mentioned in WHO Laboratory Manual (1980). The name of the patient, the period of abstinence, the date and time of collection and interval between collection and analysis were recorded in the Performa.

Inclusion Criteria

The patient's in the age group of 21- 45 suffering from infertility were included in the present study.

Age in years	Number
21-30	45
31-40	45
Above 41	10

The following category of patient's was included in the study:

Normozoospermia

Oligozoospermia

Azoospermia

Asthenozoospermia

Exclusion Criteria

Males excluded from study were those who were unable to pass specimen in the laboratory by masturbation and those who did not consent.

Patients suffering from varicocele along with other testicular diseases were not included in the present study.

Patients

Semen specimens were obtained from 100 consecutive patients, between 21 – 45 years of age. All subjects were asked for a minimum of 7 days of sexual abstinence.

Pre Sample Councelling

The patients under study were given verbal instructions about the method of ejaculation by masturbation. A sterile wide mouth plastic bottle was provided to each patient to ejaculate the sample in isolation. A previous counseling was done to avoid the stress of producing the sample.

• *Collection of Semen Sample*

Clear verbal instructions were given to the entire patient's regarding collection of semen.

The semen containers were labelled with the patient's name, registration number, date and time of collection.

Incomplete or spilled semen samples were not subjected for study.

Samples contaminated with urine, water or any other contamination was also excluded.

Samples brought from home were not included in the study.

• *Time to Process the Sample*

In all cases it was done within 1 hour after collection after proper liquefaction at 37 degree centigrade. Semen samples were analysed for volume, appearance, pH, liquefaction, concentration, motility, morphology, viability and the presence of pus cells. Semen volume was measured with a graduated disposable pipette; pH was checked with the help of pH paper.

• *Motility Preparation*

All the samples under study were kept at 37 degree centigrade & after proper liquefaction, the semen was thoroughly mixed with the help of a pipette and a thin drop was spread on a pre warm glass slide & a cover-slip of 22mmX22 mm was put over it. Sperm motility was assessed by microscope appraisal of 200 spermatozoa from different fields. Motility was categorised as immotile (IM) spermatozoa>Non progressive (NP) & progressive rapid (PR)

• *Sperm Count*

Counting of spermatozoa was done using Meckler's counting chamber. Semen samples were categorised on the basis of sperm count per millilitre of semen in accordance with WHO normal and pathological ranges i.e. normozoospermia (normal sperm count), oligozoospermia (reduced count below the reference range) and azoospermia (absence of sperms in seminal plasma). The samples categorised were compared for ejaculated volume, pus cells, motility and morphology.

• *Diagnosis of Azoospermia*

The Wet smear preparation was made after centrifugation of whole semen sample at 3000 RPM for 15 minutes. Smear was prepared from the last drop of seminal plasma & the absence of sperm was considered as azoospermic sample.

• *Morphology of Sperms*

Smear was prepared by "Feathering" method & air dried. It was stained with Giemsa stain & morphology was assessed by examining 200 sperms in randomly selected fields.

• *Criteria for Normal Seminal Parameters*

Counting of spermatozoa was done using Meckler's counting chamber. Semen samples were categorised on the basis of sperm count per millilitre of semen in accordance with WHO normal and pathological ranges i.e. normozoospermia, oligozoospermia and azoospermia.

The following operational definitions were used

Hypospermia: Volume <2mL; and Hyperspermia: Volume >5 mL Normozooospermia sperm concentration of > 20 x 10^6 spermatozoa/mL, with progressive sperm motility of > 50%, or at least 25% of spermatozoa with linear progressive motility and ≥ 30% of morphologically normal spermatozoa.

Azoospermia: absence of sperms in the ejaculate

Asthenozoospermia: Reduced progressively motile (PR) spermatozoa below the lower reference limit of 32%

Oligozoospermia: Ejaculate with sperm concentration of < 20 x 10^6 spermatozoa Per mL Oligoastheno zoospermia ejaculate with reduced sperm concentration & reduced progressively motile (PR), below the lower reference limits and motility.

Morphology of Sperms: 4-29 %, (4) is the lower limit of normal (Ref: WHO) & 29 is the upper limit of normal by strict WHO criteria.

White cell count: <1x106/ml.

Discussions

Male infertility is diagnosed when, after testing both partners, reproductive problems have been found in the male. Infertility is a widespread problem. For about one in five infertile couples the problem lies solely in the male partner.

It is estimated that one in 20 men has some kind of fertility problem with low numbers of sperm in his ejaculate. However, only about two in every 100 men has no sperm in his ejaculate. The total number of spermatozoa: this reflects sperm production by the testes and the patency of the post-testicular duct system.In most cases, there are no obvious signs of infertility. Intercourse, erections and ejaculation will usually happen without difficulty. The quantity and appearance of the ejaculated semen generally appears normal to the naked eye.

In the present study after excluding 9 samples with azoospermia, semen parameters were compared in oligozoospermic and normozoospermic samples for volume, pus cell, motility and morphology. The oligospermic samples had significantly higher percentage of non-motile sperms 62% and abnormal morphology 50% compared to normospermia in which non-motile sperms were 33%, and abnormal morphology was 30% respectively.

As high as 90% of male infertility problems are related to count and there is a positive association between abnormal semen parameters and sperm count. Oligospermia may be of slight to moderate & severe degree. Problem of sperm count, motility and morphology stems from disarray in control mechanism, including pre-testicular, testicular and post-testicular factors [5].

Azoospermia affects only about 2% of the general male population and between 10% and 20% of men undergoing fertility treatments. Azoospermia stems from a problem with sperm production or a problem with sperm transport. There are number of factors that may contribute to either of these causes. Prevalence of azoospermia in our study population was 9% and of oligospermia 44% respectively.

Seminal Volume: The total fluid volume contributed by the various accessory glands: this reflects the secretary activity of the glands. Low ejaculated volume can reflect abnormalities in accessory sex glands fluid synthesis i.e. seminal vesicle as 70% of seminal plasma contribution is from seminal vesicle. It can also be indicative of a physical obstruction somewhere in the reproductive tract or in cases of incomplete retrograde ejaculation.

Mean ejaculated volume in normozoospermia was 2.65 mL vs 1.95 mL in oligozoospermia and 1.80 mL in azoospermic sample respectively. Majority of our patients had normal semen volume of (2-5 mL) in 65%, while 30% showed hypospermia (<2ml), and 4% hyperspermia more than 5 mL. The adequate semen volume obtained in our study may be a result of the 7 days of sexual abstinence.

Our results suggest that seminal fluid volume plays little or no role in the etiology of male infertility and the role of sexual abstinence before seminal fluid sample collection for accurate semen analysis is important

Pus cells 13% in normospermia versus 16% in oligospermia & 8% in cases of azoospermia. This was not statistically significant. Infection of the male genital tract is an important factor in infertility. It is known that it may affect seminal quality through a direct action on spermatozoa or their environment, including local inflammatory reaction. When pus cells were compared, the results did not show any statistical significant difference.

The nature of the spermatozoa (their motility vitality, and morphology) and the composition of seminal fluid are also important for sperm function. These variables are largely uncontrable.

Even though the fertilization is accomplished by one spermatozoon, the actual number of sperm in semen specimen is valid measurement of fertility

The mean percentage of normal motile sperms was 67% (rapid progressive motility) in normospermia samples as compared to oligospermia in which motile sperms were 33%. Among the 33% motility only 20% of the sperms were rapid progressive & 13% were non progressive. This asthenospermia is a common cause of male infertility.

The prognosis of the infertile couple is inversely proportional to the number of abnormal patterns so one pattern of abnormality is better than two-pattern abnormality, and two is better than three-factor abnormality [20,21]. When three-pattern abnormalities were identified in oligospermic sample population, the prevalence of oligoasthenoteratospermia was 12% The results were comparable to a study in which prevalence of oligoasthenoteratospermia was 11% [12]. The prevalence of teratospermia in our study population was 7%

Morphology of sperms in relation to development of the head, midpiece and tail is a function of testes as well as the epididymis. In our study mean normal morphology in normospermia samples was 69 % vs. 57% in oligospermic samples. We did not specify the type of abnormal morphology. So sperm motility and morphology are changing parameters and their relative levels depend on the existing sperm count in an individual

Conclusions

Reproduction (or making a baby) is a simple and natural experience for most couples. However, for some couples it is very difficult to conceive. A man's fertility generally relies on the quantity and quality of his sperm. If the number of sperm a man ejaculates is substantially low or if the sperm are of a poor quality, in relation to motility & increased number of morphologically abnormal cells it will be difficult, and sometimes impossible, for him to cause a pregnancy. Precise & reproducible semen analysis is the basic investigations related to infertile couple. The use of conventional semen parameters, such as sperm

concentration, motility and morphology, are markers of male reproductive function.

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