Insight into Male Infertility: Assessment of Pattern of Semen Abnormalities

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Abstract

Objective: The aim of this study is to assess the pattern of semen abnormalities in relation to concentration, motility and morphology in couples with male factor infertility.

Methods: A cross-sectional study was conducted at infertility clinic of Jinnah Medical College Hospital from February 2015 to February 2016. Seventy-three consecutive male partners of all women attending the infertility clinic for initial workup were included. After detailed history, semen analysis, which was the basic investigation, was done and the different parameters were analysed.

Results: In this study normal sperm count was only 12 (16.4%), 23 (31.5%) pyospermia, 15 (20.5%) asthenozoospermia, azoospermia 2 (2.7%), oligospermia 3 (4.1%). Pus in semen is associated with decreased motility in 9 (12.3%) and altered morphology in 2 (2.7%) of cases. Thirty-seven (50%) in our study were tobacco chewer, 8 (11%) smoker, 2 (2.8%) alcoholic, thyroid disorders in 1 (1.4%), diabetic 3 (4.1%), hypertension 2 (2.7%), history of herniorraphy 3 (4.1%), 3 (4.1%) impotent, 1 (1.4%) premature ejaculation and 1 (1.4%) was having psychological issues.

Conclusion: This study revealed that male subfertility is a paramount factor of subfertility in our population. Tobacco chewing, smoking and infection drastically reduces the fertility potential in males.

Keywords: Semen analysis, oligospermia, male infertility, azoospermia, asthenospermia.

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Introduction

Infertility which is a global problem 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].

Approximately about 10-15% of couples suffer from infertility all over the world[2]. Males are found to be solely responsible for 20-30% of infertility cases and contribute to 50% of cases overall. How-

ever, this number does not accurately represent all regions of the world. Indeed on a global level there is a lack of accurate statistics on rates of male infertility[3]. It is estimated that 30% to 50% of men have semen of poor quality the cause of which has not been identified[4,5].

Male infertility is a serious problem all over the world as well as in Pakistan. Though the problem is mainly due to defect in sperm, however, other aetiological factors responsible for male infertility are absence of testicular tissues, bilateral castration, impaired sperm production and function, AZF gene deletion (y-deletion), hypogonadotropic hypogonadism (cryptorchidism), testicular cancer and varicocele, age > 55 years, genitourinary infection, environmental agents like extremes of temperature,

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irradiation, occupational exposure, drugs, alcohol, tobacco abuse and nutritional deficiency like trace elements e.g. selenium, zinc and vitamins. Impaired sperm transport as seen in autoimmune infertility, epididymitis, blockage of vasdeferens, ejaculatory failure, impotence, previous vasectomy and disturbance in sperm oocyte fusion e.g, abnormal egg binding proteins could be the other cause of male infertility, hence it is difficult to declare a person fertile with absolute certainty[6].

Although the clinical value of the analysis of human semen has previously been questioned[7] and semen analysis is an imperfect tool but remains the cornerstone of the investigation of male infertility[8]. It is accepted that every male infertility work-up should start with the basics, namely, a thorough history, physical examination and semen analyses[9].

A report in 2013 "Falling sperm count twenty years on, where we are now" alarmed the world about the problem and led others to investigate the phenomenon. One of the major questions raised is whether there has truly been a global decline in sperm counts in recent decades. There are obvious difficulties in establishing the truth of this situation from a global perspective because of differences between studies in terms of location, donor selection criteria, analytical methods, age distribution, ejaculation frequency, socio-economic background and racial composition, independent of any differences in environmental or life-style exposures that might have influenced testicular development and function. There have been a number of studies lending support to the falling sperm count hypothesis but others have failed to observe any perceptible temporal change[10].

This study aimed to find out the frequency of abnormal semen parameters in infertility clinic of a tertiary care hospital and to assign the specific cause of male subfertility e.g. oligospermia, Azoospermia etc.

Material and Methods

A total number of seventy-three male partners of all women attending the infertility clinic was in-cluded who visited infertility clinic for initial workup and those who were married for at least twelve months and having regular unprotected sexual intercourse. The male partners were recruited from the infertility clinic of department of obstetrics and gynaecology at Jinnah Medical College Hospital from February 19, 2015 to February 19, 2016. Sample size was calculated by using formula, in which proportion of presence of male infertility was 25% and margin of error was 10%, hence, sample size came out to be seventy-two. Detail history from the male partner was taken about age, duration of marriage, type of infertility, any babies from other partner, consanguineous marriage, living together, occupation, past medical, surgical history, coital history, any psycho-sexual dysfunction and impotence, any drug addiction and family history. After detailed history men were referred to the laboratory for semen analysis report as a part of initial workup. Male partners excluded were those who refused semen analysis, and were unable to pass sample by masturbation and who had recent two reports of semen analysis available from authentic laboratory. The males who had severe semen abnormalities, impotence or psycho-sexual problems were referred to urologist for examination and further workup and management. Detailed instructions regarding sample collection was given that abstinence of three to four days is required. All semen analysis was done by five authentic laboratories, which included, Aga Khan University Hospital, Sindh Institute of Reproductive Medicine, Concept Fertility Centre, Australian Concept Fertility Centre, and Baqai Institute of Reproductive Diseases. After taking verbal informed consent, the questionnaire was filled which was consisted of three parts, firstly demographic data and detailed history, secondly semen analysis report and lastly the diagnosis. The analysis of semen was performed by World Health Organization (WHO) lower reference limits (5th centiles and their 95% Confidence intervals) for semen characteristics (World health organization, 2010)[9]. which are volume 1.5ml (1.4-1.7), total sperm number 39 million (33-46), sperm concentration 15million/ml (12-16), Progressive Motility

(PR,%) 32 (31-34), total motility (PR+NP%), 40 (38-42), sperm morphology(normal forms,%) 4 (3.0-4.0). Data was analyzed using SPSS version 20. Frequency, percentages, mean and standard deviation (SD) were calculated for volume, concentration, active motility, sluggish motility, morphology and White Blood Cell (WBC) count.

The ethical review and research committee of Jinnah Medical and College gave ethical approval prior to starting the research study.

Results

Out of 73 patients most of 31 (42.5%) were between 26-30 years, 14 (19.2%) were 19-25 years, 12 (16.4%) were 31-35 and 13 (17.8%) were 36-40years, shown in Table.1. Large proportion 42 (65%) consulted subfertility clinic within 1-5years of marriage, 11 (17%) in 6-10 years and 11 (17%) in 11-20 years (Table 1).

Regarding Occupation 15 (25.3%) were factory worker, followed by driver 7 (11.9%), Quran teacher 5 (8%) and shop keeper 3 (5.1%).

In our study normal sperm count are only 12 (16.4%). Surprisingly large population 23 (31.5%) showed abnormal presence of white cells in semen, followed by decreased motility 15 (20.5%), Fig.1. Interestingly pus in semen was associated with decreased motility in 9 (12.3%) and altered morphology in 2 (2.7%) of cases.

Surprisingly large populations 37 (50%) in our study were tobacco chewer in form of pan and guthka, only 8 (11%) were smoker, while 2 (2.8%) were alcoholic.

Regarding medical and surgical problems, thyroid disorders were in 1 (1.4%), diabetic 3 (4.1%), hypertension 2 (2.7%) and history of herniorrhaphy was present in 3 (4.1%).

Regarding sexual problems, 3 (4.1%) were impotent, 1 (1.4%) were with history of premature ejaculation and 1 (1.4%) was having psychological issues.

Smoking is associated with pyospermia in 6 (26%), decreased motility 1 (6.7%) and large number that is 1 (50%) with decreased count along with decreased motility and altered morphology (oligo-astheno-teratozoospermia)

Tobacco chewing was largely associated with 14 (60.9%) with pyospermia, 1 (50%) with azospermia, 1 (33%) with oligozoospermia, 7 (46.7%) with asthenozoospermia, 2 (100%) with astheno-teratozoozoospermia and 5 (55.6%) with pyospermia along with astheno-zoospermia.

Diabetes was associated with infection in semen in 2 (8.7%) as compare to hypertension only in 1 (4.3%) while infection along with decreased motility was in 1 (11.1%) in both diabetic and hypertensive patients.

Discussion

In the present study, semen analysis of seventy three male partners of infertile couples was analyzed. The basic semen analysis measure semen volume, sperm count, motility, morphology and white cell count.

The data indicates that 31 (42.5%) were between 26-30 year which is in contrast with the study done by G.Mereino et.al, which concluded that age contributed to decline sperm motility and morphology in men over the age of forty[11]. In this study normal sperm count were 12 (16.4%) which is comparable 14.5% in study done in Islamabad (Pakistan)[6], but in contrast with another study in Bangladeshi population it was 38.5% normozoospermia[12].

Globally the male is considered to be a factor in nearly one-third couples affected by infertility[13]. The original meta-analysis that sperm density has decreased globally by about 50% over the past fifty to sixty years attracted considerable attention and generated much controversy[14,15]. An important point is that male infertility is not an entity but reflects a variety of different pathogenic mechanisms[16]. A study on the South African population[17] has indicated the male to be responsible for 70% cases of

Table 1. Demographic data of male infertility subjects with semen abnormalities

Age	Frequency	Percentage %
19-25	14	19.2
26-30	31	42.5
31-35	12	16.4
36-40	13	17.8
Married since	Frequency	Percentage %
1-5	42	57.5
6-10	11	15.1
11-15	6	8.2
16-20	5	6.8

Table 2. Semen parameters in various groups of male infertility.

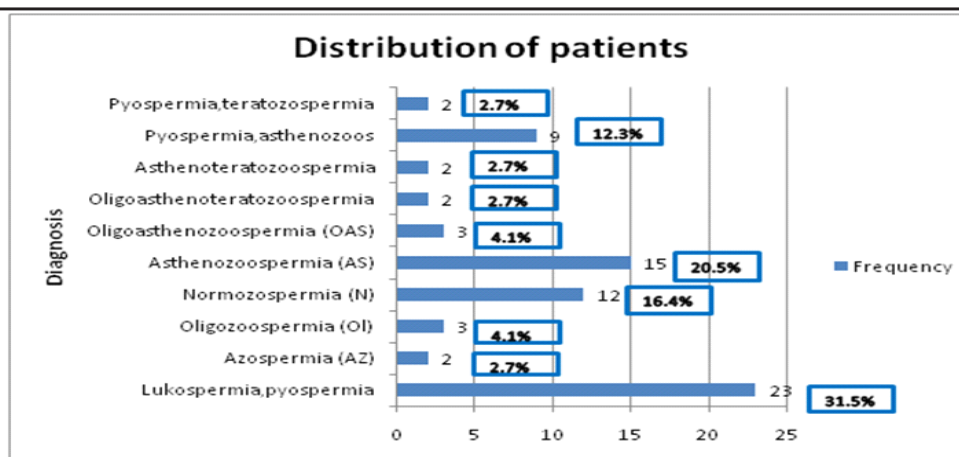|	Parameters						
GROUPS	Age	Volume	Concen- tration	Active motility(RLP)	Grade 2(sluggish motility)	Morphology	WBC
Lukospermia, Pyospermia	31.5±6.0	2.7±1.6	70.6±32.7	56.6±20.0	21.7±11.2	73.1±9.9	7.4±5.8
Azospermia (AZ)	27±4.2	2.5±2.1	0	0	0	0	1±0
Oligozoospermia (Ol)	32.3±4.6	2.8±1.0	9.3±3.1	26±21.3	26.7±7.6	51.7±2.9	2.5±0.7
Polyzospermia (P)	0	0	0	0	0	0	0
Normo- zospermia (N)	27.7±6.1	2.7±1.2	92.8±65.8	47.6±19.1	37.3±10.8	59±19.1	1±0.6
Astheno- zoospermia (AS)	30.4±5.5	2.4±1.1	39.6±26.7	12.3±16.2	44.2±16.6	36.4±16.3	1.3±0.5
Oligoastheno zoospermia (OAS)	26.7±7.5	3.8±1.0	9.0±2.6	1.7±2.1	42±13.1	28.3±5.8	1±0
Oligoasthenotera- tozoospermia	31±1.4	2.5±0.7	10.5±3.5	2.5±3.5	10±0	2.5±2.1	2±0
Oligotertoz- Oospermia	0	0	0	0	0	0	0
Asthenotera- tozoospermia	28±4.2	3.3±1.1	80±14.1	0	45±7.1	2±0	4.5±0.7
Pyospermia, asthenozoos	31.6±4.7	2.5±1.2	29.4±12.6	11.1±9.3	46.9±7.7	28.8±11.4	4.3±2.6
Pyospermia, teratozospermia	25.5±0.7	4±0	107.5±102.5	30±35.4	50±0	6±5.7	3.5±0.7

Fig 1. Classification of semen abnormalities based on the concentration, motility and morphology

infertility, which is comparable to our study and showed 84% abnormal sperm parameters on basis of concentration, motility, morphology and WBC in semen. Another study done in Rome(Italy) on 2935 infertile couples from 2004-2009 showed only 35% of males had normozoospermia that is 65% showed alteration in at least one seminal parameter[18].

Nalka K.P in his study concluded that the sperm motility provide more accurate information than morphology (WHO and Tygerberg's criteria) during the fertility evaluation. Redefining reference concentration and morphology may significantly increase the importance of routine semen analysis[19]. Several studies have demonstrated the correlation of motility with the fertilization rate in vivo and in vitro. Krause W, also found sperm concentration and percentage of motile spermatozoa, a predictor of fertility outcome in vivo[20]. In our study isolated asthenozoospermia has been reported in 15 (20%) and asthenozoospermia along with increased WBC count in another 9 (12.3%), which is comparable to a study in which it has been reported that 24% of patients undergoing infertility evaluation, which is comparable to studies done in Islamabad(Pakistan) and Central India[6,21].

There is a continuing debate over the role of normal morphology in male infertility and its value in the evaluation and management of the infertile men[22]. In this study Asthenoteratozoospermia 2 (2.7%), Oligoasthenoteratozoospermia 2 (2.7%) and altered morphology along with infection is 2 (2.7%) that is comparable to study which showed total of 3.3% of teratozoospermia including teratozoo-spermia, oligoteratozoospermia and oligoasthenoteratozoospermia[18].

In this study the reported incidence of azospermia is 2 (2.7%) which is low as compared to Kenya and Nigeria, which reported 11.35%[23] and 12% respectively[24]. However, when the incidence rate of azospermia was compared with USA it was found to be 4% in a study of 1350 infertile couples which is comparable to our study[24]. Although other studies done in Pakistan reported incidence of azospermia 12.32%[25] and 13.3%[6] which is also

high compared to this study. However there is high variability between 5-59% of infertile men[26], as reported by studies done in three French region

Various parameters may be abnormal. A useful guide to prognosis is that one factor abnormality tends to be associated with a better prognosis than a two factor which in turn is better than a three factors (abnormality factors are count, motility and morphology)[27]. In this study oligoasthenoteratozoopermia reported 2 (2.7%), which is low to study in which its prevalence was 11%[28] but comparable to study in which it was reported 1.39%[18].

Infection of the male genital tract is an important morbidity factor. It is known that it may affect seminal quality through a direct action on spermatozoa or their environment, including local inflammatory reaction[6]. In this study pyospermia is associated with asthenozoospermia in 9 (12.3%) of cases and altered morphology teratozoospermia in another 2 (2.7%) of cases.

Stutz G et al concluded in their study that alcohol, tobacco and aspirin use could have detrimental effect on seminal parameters and that men who wish to procreate should be warned about such effect[29]. In this study smoking was associated with pyospermia in 2 (26%), asthenozoospermia 1 (6.7%) and 1 (50%) with oligoasthenoteratozoospermia while tobacco chewing was associated with 14 (60.9%) with pyospermia, 1 (50%) with azospermia, 1 (33%) with oligospermia and 46.7% with astheno and 2 (100%) with asthenoteratozoospemia and another 5 (55%) astheno along with pyospermia which is comparable to study, which observed that smoking and tobacco chewing for longer period may change semen quality and on the semen analysis 62% had azospermia while 46% had oligozoospermia and only 2% have normal count[30].

Regarding recommendation, in our population where male infertility is not well reported in general and female partner is often blamed for infertility, we must reduce impediment and cultural belief. As a society we must give appropriate apprehension about male infertility and its associated factors.

Moreover media can also play its role in making the mass realization of the problem. Also this is a cross-sectional, institutional based study and mostly patients limited to Korangi industrial area therefore cannot be applied in general population.

Conclusion

Male infertility is a serious under recognized health issue. Assessment of male infertility by simple, cheap and non-invasive conventional semen analysis is a cornerstone of male initial workup schedule. In this study almost eighty-four percent of male had abnormal semen analysis that suggests male factor infertility has not been researched or studied to truly understand its magnitude and prevalence, especially in our society due to cultural and social barriers. It is a great challenge in term of diagnosis, awareness, prevention and treatment.This study supports falling sperm count hypothesis but needs more elaborate multicentred research for a definitive conclusion. In our population, main contributors are smoking and tobacco chewing.

Conflict of Interest

Authors have no conflict of interest and no grant/funding from any organization for this study.

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