Original Article

Semen profile of male partners of women attending infertility clinic in Zaria, Nigeria

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ABSTRACT

Background: Semen analysis is an important investigation in the evaluation of male factor infertility. Diminishing semen profile has been widely reported mostly attributed to the environmental factor and lifestyle changes.

Methodology: A cross-sectional study of 154 male partners of women attending infertility clinic at Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. The study was done between January and October 2011. The data were collected using questionnaires, semen analyses, semen cultures, and body mass index (BMI).

Results: The semen analyses done showed normozoospermia rate of 46.8% while 53.2% had abnormal semen profile. In this study, only 3.9% of the participants' semen that had significant round cells also cultured bacteria. There was no significant statistical association between the round cells count and bacteria culture. Bacteria growth was mainly *staphylococcus aureus*. There was also a significant statistical association between abnormal semen profile and the risk factors in male infertility, medication use, coital frequency per week, and positive semen culture for bacterial growth.

Conclusions: Proportion of participants with abnormal semen profile was high in this study. Significant round cell count did not translate to infected semen. There should be properly coordinated and heightened health education program on awareness and prevention of male infertility.

Key words: Male infertility; round cells; semen analysis; semen culture.

Introduction

It is estimated that about one in ten couples has difficulty in conceiving successfully. Infertility presents serious psychosocial problems to the affected couples and challenges to the attending gynecologist. Women suffer more than men as the causes are often attributed to them, especially in Africa. The etiological pattern of infertility in couples varies among different populations. In general, about 35% are caused by male factors and 35% by female factors while 20% are due to combined male and female factors, and in about 10% of the couples, the causes are unexplained.[1] Causes of male infertility generally result from endocrine disorders, anatomic disorders, abnormal spermatogenesis, abnormal motility, infection of genital tract, and sexual dysfunction.[2] Infections of the male genital tract are common causes of male infertility in Africa. Gonococcal, chlamydial, and coliform infections may cause semen profile abnormalities. Inflammatory damage may result in vas deferens or epididymal block with resultant severe oligozoospermia or azoospermia.[1,2] Infertility may be prevalent among men with elevated body mass index (BMI). Forty percent of men presenting to an infertility clinic in a study in California, USA, were overweight.[3]

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Access this article online	
Website: www.tjogonline.com	Quick Response Code
DOI: 10.4103/TJOG.TJOG_18_18	

How to cite this article: Garba-Alkali AE, Adesiyun AG, Randawa AJ. Semen profile of male partners of women attending infertility clinic in Zaria, Nigeria. Trop J Obstet Gynaecol 2018;35:256-60.

Semen analysis is one of the most important investigations used to evaluate the male partners of women presenting with infertility. The World Health Organization (WHO) reference values and criteria are widely used as a guide for normal parameters.[4] These have been reviewed four times since 1980, in 1987, 1992, 1999, and 2010 by the WHO.[4-7] Males with good or reasonable fertility potential under *in vivo* condition are identified on the basis of semen quality. Furthermore, males with poor fertility potential are identified and introduced to treatment including assisted reproduction technology (ART). A fertile female may compensate for the fertility problem of the male, and thus, infertility usually only becomes manifest if both partners have reduced fertility. The prognostic factors for male infertility are duration of infertility, age, primary or secondary infertility, result of semen analysis, and fertility status of the female.[1,4,7,8] There have been significant advances in ART, from artificial insemination, improved embryo culture media to intracytoplasmic sperm injection and preimplantation genetic diagnosis, which has resulted in remarkable increase in *in vitro* fertilization and embryo transfer pregnancy rates. Potent drugs are also now available for erectile dysfunction. These, in addition to the increasing public awareness and acceptance of ART, have spurred many couples in sub-Saharan African societies with infertility to seek medical care.[2,9] This study evaluated the semen profile of the male partners of women attending infertility clinic. It also sought to know if significant round cell count in semen should be taken as an evidence of infection.

Methodology

This was a cross-sectional study conducted from January to October, in the year 2011. The study population was made up of male partners of women attending infertility clinic that consented and presented their semen for analysis as part of investigation for infertility.

Inclusion criteria are first seminal fluid analysis, no prior treatment (medical or surgical) for infertility, semen fluid analysis, and culture done in the laboratory of the study setting, Ahmadu Bello University Teaching Hospital, Zaria.

Exclusion criteria are participants who did not consent or withdrew their consent, semen samples which method of collection did not comply with the instructions or contaminated sample, participants on antibiotics, or treatment for infertility. The WHO (1992) reference values and criteria were used as normal parameter guide for semen profile.

Results

A total of 154 semen samples were analyzed, and the age of the clients was between 20 and 60 years. More than half 86 (55.9%) of the clients were within the age group of 31–40 years, followed by 34 (22%) in the age group of 41–50 years, then 28 (18.2%) in the age group of 20–30 years. The least age group in the study was 51–60 years with 6 (3.9%) clients. Hausa tribe constituted the major tribe in the study with 72 (46.7%) clients. Majority were civil servants 54 (35.0%) followed by lecturers/teachers 26 (16.9%). More than three quarters, 136 (88.3%) resided in urban centers. Almost two-thirds 94 (61.0%) of the clients had tertiary education. Majority 68 (44.2%) had a history of 1–3 years duration of infertility followed distantly by 7–9-year duration in 30 (19.5%) patients. The least duration of infertility was 4–6 years in 22 (14.3%) clients. The type of marriage in more than three quarters, 124 (80.5%) of the clients was monogamy while only 30 (19.5%) were practicing polygamy.

Almost two-thirds, 100 (64.9%) of the clients has had coital frequency of ≥3 times per week while the remaining had <3 times/week. About 44 (28.9%) had secondary infertility, and the remainder had primary infertility.

Past sexually transmitted diseases (STDs) constituted the major risk factor in 42 (27.3%) clients, followed by alcohol intake and urethral penile discharge 22 (14.3%), then cigarette smoking in 20 (13%) clients. Among the medications used are for the treatment of peptic ulcer disease which ranked highest 18 (11.7%), followed distantly by medication for HIV/AIDS in 8 (5.2%) clients. Majority of the clients 134 (87%) were not on chronic medication [Table 1].

Majority of the clients 72 (46.8%) had normal semen analysis (normozoospermia), and 82 (53.2%) had abnormal semen profile. The breakdown of the types of abnormalities of semen profile seen in the 82 participants was asthenozoospermia 34 (41.5%), oligoasthenoteratozoospermia (OAT) 24 (29.3%), azoospermia 16 (19.5%), and the least abnormality was oligozoospermia 8 (9.7%). Aspermia was not seen [Figure 1]. Majority of the semen cultured did not grow any organism in 132 (85.7%) cases. Among the cultured organism, *staphylococcus aureus* was the most common in 14 (63.6%) cases Table 2. Table 1 showed that there was a significant statistical association between abnormal semen analysis in relation to the risk factors, chronic medication, and coital frequency. On the contrary, there was no significant association in relation to duration of infertility, types of infertility and types of marriage. Normal BMI was in majority in 84 (54.5%) clients, followed distantly by overweight

Table 1: Cross tabulation of clinical variables and semen analysis (n=154)

Clinical variables	Normal semen analysis (%)	Abnormal semen analysis (%)	Statistical significance
Duration of infertile (years)			
1-3	34 (22.1)	36 (23.3)	χ^2=4.619, d=3, P=0.2
4-6	8 (5.2)	12 (7.8)	
6-9	20 (13.0)	14 (9.1)	
10 and above	10 (6.5)	20 (13.0)	
Risk factors for infertility			
Inguinoscrotal problems	2 (1.3)	32 (20.8)	χ^2=31.02, d=5, P=0.000009282
Past penile discharge	10 (6.5)	12 (7.8)	
Past STD treatment	16 (10.4)	18 (11.9)	
Smoking history	8 (5.2)	10 (6.5)	
Alcohol intake	22 (14.3)	8 (5.2)	
Erectile dysfunction	6 (3.9)	10 (6.5)	
Medication			
Medication use	12 (7.8)	22 (14.3)	χ^2=8.825, d=1, P=0.002971
Nil medication	56 (36.4)	30 (19.5)	
Type of infertility			
Secondary	24 (15.6)	20 (13.0)	χ^2=1.502, d=1, P=0.2208
Primary	48 (31.2)	62 (40.2)	
Types of marriage			
Monogamy	54 (35.1)	70 (45.4)	χ^2=2.626, d=1, P=0.1051
Polygamy	18 (11.7)	12 (7.8)	
Coital frequency/week			
<3	18 (11.7)	36 (23.4)	χ^2=6.016, d=1
Three and above	54 (35.0)	46 (29.9)	P=0.01418

STD, Sexually transmitted diseases

Table 2: Types of bacterial growth from semen culture (n=22)

Bacterial growth	Frequency (%)
Staphylococcus aureus	14 (63.6)
Gardnerella vaginalis	2 (9.1)
Escherichia coli	4 (18.2)
Klebsiella species	2 (9.1)

46 (29.9%), then underweight and obese in 14 (9.1%) and 10 (6.5%) participants, respectively. The study showed no significant statistical association between normal semen analysis and abnormal semen analysis in relation to BMI [Table 3].

About 24 (15.6%) of the client semen cultured grew organism while the rest, 130 (84.4%) did not grow any organism. There was no significant statistical association between the normal and abnormal semen analysis in relation to the semen culture [Table 4]. In the semen analysis, there were nonsignificant semen round cells (<5.0 × 10^6 ml) in 104 (67.5%) of the semen analyzed, while about 50 (32.5%) had significant semen round cells of >5.0 × 10^6 per ml. There was no significant statistical association among the participants with significant round cell count and bacteria growth [Table 5].

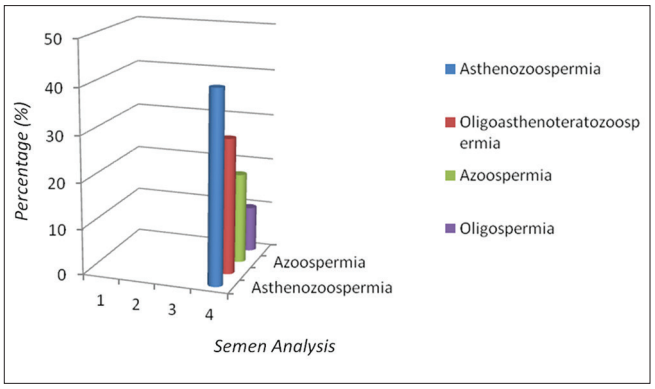

Figure 1: Distribution of abnormal semen analysis in male partners

Discussion

Semen analysis is the most widely used preliminary investigation to assess man fertility, and it is relatively easy to perform, affordable, and widely available. However, it is pertinent to note that the interpretation of semen analysis abnormalities serves at best as a guide. This is because fertility potential has not been found to be directly proportional to the gross appearance. In fact, there has been surprising fertility recorded in some men with the poor count, and wide variations are even obtainable in normal fertile men.[10]

The semen analysis was done in this study showed a normozoospermia rate of 46.8% while about 53.2% had abnormal semen profile. This is similar to reported rates of 29% to 42.4% for normozoospermia from other studies.[11-14] However, in other series high rates of normozoospermia in the range of 62.7% and 78.4% was reported.[15-17] The abnormality of semen profile in this study is above average (53.2%). Among the abnormal semen profile, asthenozoospermia constitutes the most common with 22% followed by OAT (15.6%), azoospermia (10.4%), and oligozoospermia (5.2%). These rates and array of abnormalities are similar to the study findings from Ibadan, Southwest Nigeria[15] but in contrast to the findings of a study done in Jos, North Central Nigeria.[14] Treatment and more importantly preventive strategies are needed to be reappraised by the clinician and public health practitioner to reduce the problem. ART services at least in tertiary health facilities are vital in the treatment of some of these cases.

The finding that about 10.4% of the participants have azoospermia is worrisome as this rate is significantly high. The possible causes are STD, trauma, congenital problems such as cystic fibrosis and viral infection such as mumps among others. A related study showed the most common association between azoospermia and past illness of smallpox where out of 31 participants with history of smallpox, 15 showed complete azoospermia, and one showed sperm

Table 3: Body mass index and semen analysis ($n=154$)

Clinical variables	Normal semen analysis (%)	Abnormal semen analysis (%)	Statistical significance
BMI			
Underweight (<18.5)	8 (5.2)	6 (3.9)	$\chi^2=4.451$, $d=3$, $P=0.2167$
Normal weight (18.5-24.9)	38 (24.7)	46 (29.9)	
Overweight (≥25.0)	24 (15.6)	22 (14.3)	
Obese (≥30.0)	2 (1.3)	8 (5.2)	

BMI, Body mass index

Table 4: Semen culture yield and semen analysis ($n=154$)

Clinical variables	Normal semen analysis	Abnormal semen analysis	Statistical significance
Semen culture			
Organism growth ($n=24$)	6 (25)	18 (75)	$\chi^2=6.052$, $d=1$, $P=0.01389$
Nil organism growth ($n=130$)	66 (50.8)	64 (49.2)	

Table 5: Significant semen round cell count versus bacterial growth ($n=154$)

Semen round cells	Bacterial growth (%)	No bacterial growth (%)
Nonsignificant semen round cell count (<5.0×10^6/ml) ($n=104$)	16 (10.4)	88 (57.1)
Significant semen round cell count (≥5.0×10^6/ml) ($n=50$)	6 (3.9)	44 (28.6)

$\chi^2=0.3159$, $d=1$, $P=0.5741$

density of <10 million per mL.[18] Most participants in this category will require treatment by ART, most likely with donor sperm for them to achieve their dream of fatherhood. This is a challenge to the practice of ART, especially in settings where there is no regulation or law guiding the practice of ART, as cultural inclination and religious belief may be against some forms of ART treatment practices. The most common abnormality of asthenozoospermia has problem with motility, which is vital for fertilization process, while OAT has a combination of low sperm count, abnormal motility, and morphology. This group of patients may benefit from ART or intrauterine insemination (IUI) depending on the severity. Training and retraining of trainers and qualified trainees toward making IUI more accessible at most secondary and tertiary health institutions would help a long way.

In this study, about 3.9% of the client's semen that had significant semen round cell count also cultured bacteria. This proportion is small, and there was no significant statistical association between the semen round cell count and bacteria culture. This is a similar finding to the studies from Jos, Northwest Nigeria[14] and Ibadan, Southwest Nigeria.[19] The implication is that having significant semen round cells in semen microscopic analysis do not translate to the growth of an organism in the semen. This should be borne in mind when interpreting results by physicians that significant count of semen round cells does not singularly warrant antibiotic treatment for purported infection.

Bacteria growth in this study was 14.3%, mainly *S. aureus* (63.6%) followed distantly by *Escherichia coli, Gardnerella vaginalis,* and *Klebsiella* growth. This is in consonance with similar studies from the southern part of Nigeria.[19,20] However, it is in contrast to the study result from Tunisia on semen culture and polymerase chain reaction assay; the prevalence of bacteriospermia in semen was 56.9% and the common bacteria species detected were *Chlamydia trachomatis* followed by *Ureaplasma urealyticum* and *Mycoplasma hominis*.[3] Contamination during collection and/or transportation of semen may not be totally ruled out in this study, more so with the growth of unusual organisms such as *G. vaginalis* and high yield of *Staphylococcus*. It is also pertinent to note that organisms implicated in the causation of low sperm count and abnormal sperm function (mainly sexually transmitted organisms) need special means of transportation and culture techniques, which were not applied in this study.

In this study, there were also a significant statistical association between abnormal semen profile in relation to the risk factors for infertility, medication use, and coital frequency per week. While there was no statistical significant difference in semen profile and the duration of infertility, types of marriage, and BMI. Infertility may be prevalent among men with elevated BMI. Forty percent of men presenting to an infertility clinic in a study in California, USA, were overweight.[3] However, the relationship between male obesity and other fertility parameters has not been well established. Decreased testosterone, sex hormone-binding globulin, and testosterone/estrogen ratios and inhibin B have all been documented among infertile obese compared with infertile nonobese men and fertile obese men.[21]

The findings that risk factors for infertility, drug use for diseases, higher coital frequency are more associated with abnormal semen profile are not unexpected since they are established risk factors of infertility. In a study of infertile African male at an andrology clinic in South Africa, 49% were secondarily infertile and 36% had previously received treatment for a urethral discharge. Varicoceles were present in 183 cases (11%) and 11% had serological evidence of previous exposure to syphilis.[22] On the contrary, most patients in this series had primary infertility.

Conclusions

The rate of abnormal semen profile was high in the study. Most men that had their semen analyzed had primary infertility, and there was significant association between

abnormal semen profile and known risk factors of male infertility, which are mainly preventable. These findings call for focused and heightened preventive strategies toward decreasing the occurrence of these risk factors.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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