ISSN 0972-4958

Journal of Medical Society

www.jmedsoc.org

Volume 30 / Issue 3 / Year 2016

A Publication of Regional Institute of Medical Sciences, Imphal

Medknow

Wolters Kluwer

Original Article

Determinants of infertility in male partners of infertile couples at a public health facility in Ilorin, Nigeria

Lukman Omotayo Omokanye, Abdulwaheed Olajide Olatinwo, Kabir Adekunle Durowade[1], Isiak Funsho Abdul, Sikiru Abayomi Biliaminu[2]

Departments of Obstetrics and Gynaecology and [2]Chemical Pathology and Immunology, College of Health Sciences, University of Ilorin, Ilorin, [1]Department of Community Medicine, Federal Teaching Hospital, Ido-Ekiti, Ekiti, Nigeria

Abstract

Background: Infertility is the most important reproductive health and social issue confronting married couples in our environment. The contribution of male factor is assuming a tremendous proportion. Seminal fluid analysis (SFA) remains an indispensable tool in the evaluation of the fertility potential of these male partners. **Aim and Objectives:** This study aimed to determine the pattern of seminal fluid parameters and its impact on infertility among male partners of infertile couple at a public health facility in Ilorin. **Materials and Methods:** A cross-sectional study of the seminal fluid indices of consecutively consenting male partners of infertile couple seen at the Assisted Reproductive Technology (ART) Unit of the Department of Obstetrics Gynecology, University of Ilorin Teaching Hospital, Ilorin, between January 1, 2012 and December 31, 2014. **Results:** All male partners of infertile couple who had infertility consultation at the ART unit consented to SFA during the study period. The patients were aged 27–67 years. One hundred and seventy-five (56.1%) patients had normal parameters. There was a high level of leukocytospermia and bacterial infections in both normospermic and oligospermic semen. The predominant organism was *Staphylococcus aureus*. Of the sociodemographic and reproductive/hormonal variables, only the age was found to have statistically significant association with types of infertility. **Conclusion:** Male factor is increasingly assuming a significant role in the etiology of infertility in Ilorin. The practitioners should, therefore, endeavor to involve them early in the overall management to reduce stigmatization and ostracizing of women for infertility.

Key Words: Determinants, infertile couples, leukocytospermia, Nigeria

INTRODUCTION

Infertility is defined as the inability to achieve pregnancy within 1-year duration of regular (evenly spaced 48 h interval) ejaculatory vaginal sexual intercourse without the contraception between a man and a woman in the reproductive age.[1] It occurs worldwide but differs in incidence and prevalence. It is a sensitive issue in our environment and a social stigma in many Nigerian cultures. Historically, infertility is considered a woman's disease. It is only within the last 50 years that the importance of the male factor contribution to infertility has been recognized.[2]

Address for correspondence: Dr. Lukman Omotayo Omokanye, Department of Obstetrics and Gynaecology, College of Health Sciences, University of Ilorin, Ilorin, Nigeria.
E-mail: omostuff1111@yahoo.com

Access this article online

Quick Response Code:

Website: www.jmedsoc.org

DOI: 10.4103/0972-4958.191180

Twenty-five percent of couples conceive after 1 month of unprotected intercourse. Sixty-three percent conceive after 6 months, 75% after 9 months, and 85% after 1 year. However, about 15% are unable to do so without assistance.[3] Infertility remains a big problem worldwide and the male partner is implicated in 50% of cases.[4,5] Generally, one out of seven couples will have problem with fertility.[3] The prevalence of infertility is high in Sub-Saharan Africa, with a prevalence rate of 20–46%.[6] In Nigeria, various studies reported the incidence of 20–30%.[7] In Western countries, 10–15% of couples experience infertility.[8] Male partners directly account for 25–30% of infertility and contribute to another 25%.[6,8]

Seminal fluid analysis (SFA) constitutes an important tool in the investigation of infertile male partners. The

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Omokanye LO, Olatinwo AO, Durowade KA, Abdul IF, Biliaminu SA. Determinants of infertility in male partners of infertile couples at a public health facility in Ilorin, Nigeria. J Med Soc 2016;30:153-7.

information obtained aid in diagnosing the nature of the infertility.[3] In 1929, Macomber and Sanders reported the normal sperm density to be 100 million/ml.[9] Twenty years later; Abner Weisman reported a density of 80–120 million/ml. It was not until the Macleod and Gold is landmark study in 1951 that a density of 20 million/ml was accepted as a statistically important limit below which the likelihood of infertility appeared to increase.[9] Various parameters have also been proposed for motility and morphology but the widely accepted values remain that of Macleod and Gold who proposed 50% progressive motility and 30% morphology as the lower limit and has been adopted by the World Health Organization (WHO).[9] However, Kruger *et al*. in 1986 described strict criteria where <14% normal morphology would indicate the need for assisted conception.[10]

This study was designed to assess the quality of seminal fluid of men in infertile marriages who attended the ART unit of the Department of Obstetrics Gynecology, University of Ilorin Teaching Hospital, Ilorin, between January 1, 2012 and December 31, 2014 with a view to identify the possible contribution of the male factor to overall infertility problems in this environment.

MATERIALS AND METHODS

This is a cross-sectional study of the seminal fluid indices of consecutively consenting male partners of infertile couples seen at the Assisted Reproductive Technology (ART) Unit of the Department of Obstetrics Gynecology, University of Ilorin Teaching Hospital, between January 1, 2012 and December 2014. The WHO standard was used in the collection and processing of the samples.[11] A total of 312 consenting male partners of infertile couple were recruited into the study.

Preproduction counseling was given to all the clients. These include abstinence from sexual intercourse or masturbation for a period of 3–5 days and avoiding the use of antibiotics prior to collection. Sample collection was carried out in the dedicated semen collection room within the unit by masturbation with the aid of sterile container and transported to the laboratory immediately while maintaining sample at body temperature (37°C). Examination was conducted after liquefaction or within an hour.

Using WHO standard,[11] semen analysis was carried out by determining semen liquefaction, volume, appearance, pH, sperm concentration, motility, morphology, viability, and the presence of white blood cell or red blood cell. Each semen sample was cultured in appropriate culture media at 37°C for 24–48 h to detect any associated bacterial pathogens and positive samples. Using a Pasteur pipette, a drop of the sample was placed on a clean grease free slide with a cover slip placed on top of the slide. Examination under the microscope was done using ×10 objective lens to observe for motile sperm cells. Motility pattern observed were graded as rapid progressive motile, slow progressive motile, nonprogressive motile, and nonmotile. Observation under the microscope using ×40 objectives was then conducted to assess the morphology of the cells.

To obtain the sperm count, a 1 in 20 dilution of the semen in distilled water was made, i.e., 1 ml of semen to 9 ml of distilled water. These were mixed and used to charge the counting chamber (improved Neubaur chamber). Examination under ×10 microscope objective lens was done and the numbers of cells in the recommended squares were counted. The total number of cells were obtained by multiplying the number of cells counted by the dilution factor. The result obtained was multiplied by 10 to finally arrive at the sperm count or concentration per ml.

In assessing the morphology of the spermatozoa, an aliquot of semen was washed with Quinn's Sperm Washing Medium, SAGE (USA) and centrifuged at 300 g for 10 min. The supernatant was removed, and 0.5 ml of Quinn's medium was added to the remaining pellet. Ten microliters of washed semen was then spread onto a glass slide, fixed and air-dried. The smears were washed with distilled water and stained with Spermac stain, FertiPro (Beernem, Belgium). After staining, the smears were washed with distilled water. Two different examiners counted 200 cells per smear using bright field illumination at a final magnification of ×1000 and oil immersion. Strict criteria were applied for the evaluation, according to which a spermatozoon is normal if it has an oval head, 4.0–5.0 μm long, and 2.5–3.5 μm wide, measured with an ocular micrometer. The length-to width ratio should be 1.30 :1.80. A normal spermatozoon has a well-defined acrosome that covers 40–70% of the head. The mid piece is thin, <1 μm wide, about 1.5 times longer than the head. Cytoplasmic droplets, if present, should not be larger than half of the head width. The tail is thin, uniform, uncoiled, and about 45 μm long. According to this classification system, all borderline forms are considered abnormal.[11] Classification of the various forms of semen abnormalities was done using the WHO guidelines.[11] Azoospermia was indicated by the absence of spermatozoa in the ejaculate. Oligospermia meant the concentration of spermatozoa <15 million/ml. Asthenozoospermia meant <40% motility. Teratozoospermia meant <4% of sperm cells had normal morphology.

Hormonal profile was assessed by taking 6–8 ml of venous blood from each patient, with most collections done between 9.00 am and 11.00 am. The blood was collected in plain containers and allowed to clot. Each sample was centrifuged at 1000 rpm for 10 min to achieve separation.

The serum obtained was put into aliquots in each case, labeled and stored at −20°C. One aliquot of each specimen was taken at a time, to avoid repeated freezing and thawing, and the sample were analyzed for hormone estimation using enzyme immune-assay (EIA), according to the WHO matched reagent protocol (manual) for EIA kits (protocol/version of September 2014.

Statistical analysis was done using a commercial statistical package (SPSS/PC Version 16.0, SPSS Inc., Chicago IL, USA). Frequency tables and cross tabulations were generated to show the association between the sociodemographic and reproductive variables and the type of infertility among the subjects. A $P < 0.05$ was considered statistically significant.

RESULTS

Three hundred and twelve male partners of infertile couple who had infertility consultation at the ART unit consented to SFA during the study period. The patients aged 27–67 years with a mean age of 41 ± 7.3 years. One hundred and seventy-four (55.8%) were civil servants and more than half (61.9%) belong to middle-social class. One hundred and sixteen (37.2%) had primary infertility, whereas 196 (62.8%) had secondary infertility. Their duration of infertility ranged from 1 to 33 years (6.9 ± 5.4 years) [Table 1].

One hundred and seventy-five (56.1%) had normal semen quality or parameters, whereas 137 (43.9%) had abnormal semen quality or parameters. The abnormal semen parameters consisted of oligozoospermia (36.5%) azoospermia (3.8%), asthenozoospermia (1%), oligo-asthenozoospermia (0.6%), and oligo-astheno-teratozoospermia (1.9%). There was a high level of leukocytospermia and bacterial infections in both normospermic and oligospermic semen. The predominant organism was *Staphylococcus aureus* [Table 2].

Table 3 showed the determinants of infertility among male partners of infertile couple. It was found that age has significant association with types of infertility ($P = 0.003$) whereas social class, duration of infertility, semen analysis, leukocytospermia, hormone profile, and serum prolactin level did not ($P > 0.005$).

Table 1: Sociodemographic variables (*n*=312)

Variables	Frequency	Percentage
Age of husband (years)		
25-29	3	1.0
30-34	62	19.9
35-39	71	22.8
40-44	80	25.6
≥45	96	30.8
Range (years)	27-67	
Mean (years)	41±7.3	
Occupation		
Civil servant	174	55.8
Professionals	50	16.0
Military	3	0.9
Artisans	5	1.6
Trading/business men	61	19.6
Drivers	6	1.9
Clergy		8
Farming	1	0.3
Unemployed	4	1.3
Social class		
Low	111	35.6
Middle	193	61.9
High	8	2.5
Type of infertility		
Primary	116	37.2
Secondary	196	62.8
Duration of infertility (years)		
1-10	250	80.1
11-20	54	17.3
>20	8	2.6
Range (years)	1-33	
Mean (years)	6.9±5.4	

DISCUSSION

In this study, all male partners of infertile couple who attended the ART clinic during the study period had SFA done. This compares favorably with 97.3% reported in a secondary health facility in South-Eastern, Nigeria.[6] However, this was in contrast with report from other centers which tend to state that African men do not like to do SFA.[12,13] This finding may be attributed to proper counseling from the reproductive medicine clinicians and encouragement from fellow men attending the infertility clinic coupled with increasing awareness that infertility is a problem of the couple. Almost two-thirds (61.9%) of our clients belong to the middle-social class which is because our center is a dedicated infertility clinic with the state-of-the-art facilities that offers specialist services which may be beyond the reach of the poor.[14]

The findings of seminal fluid abnormalities in 137 (43.9%) among male partners of infertile couple in this study agree with earlier reports at Ile-Ife[15] and Ibadan[16] in South Western Nigeria. It is, however, lower than 69.1%, 17 and 71%, 18 reported in Lagos and Jos, Nigeria, respectively, but slightly higher than 23.3% reported in another study in Lagos, Nigeria, by Adeniji *et al.*[16] Furthermore, the predominance of secondary infertility among male partners of infertile couples of 62.8% as against 37.2% of primary infertility is in keeping with findings from other researchers in Sub-Saharan

Africa.[16,17] This may be due to the postinfective causes which are common in Africa.[16,17]

Table 2: Seminal fluid analysis

Variables (*n*=312)	Frequency	Percentage
Sperm count		
Normospermia	175	56.1
Oligospermia	114	36.5
Asthenozoospermia	3	1.0
Azoospermia	12	3.8
Oligoasthenia	2	0.6
Severe oligospermia	6	1.9
Motility (%)		
<40	260	83.3
>40	52	16.7
Morphology (% normal)		
<4	278	89.1
>4	34	10.9
pH		
7.00	3	1.0
7.80	75	24.0
8.00	232	74.4
8.50	1	0.3
9.00	1	0.3
Pus cells nil	155	49.7
0-3+	145	46.5
>4+	12	3.8

Abnormalities of SFA recorded in this study were oligospermia 43.9%, azoospermia 3.8%, asthenozoospermia 1%, oligoasthenozoospermia 0.6%, and oligoasthenoteratozoospermia 1.9% as a major contributor to male infertility is in tandem with earlier reports in Nigeria.[15-17] However, the combined defects in semen quality of asthenozoospermia, oligoasthenozoospermia, and oligoasthenoteratozoospermia observed in this study were slightly lower than the figures reported by Agu *et al*.[3] and Imade *et al*.[5] in Kano and Jos, Nigeria, respectively. This disparity may be due to the limited sample size in our study.

It has been observed that samples with multiple defects have low fertilizing capacity. Hence, a useful guide to prognosis is that a one-factor abnormality tends to be associated with a better prognosis than a two-factor abnormality which in turn is better than a three-factor abnormality.[3] These factors are responsible for the poor results obtained by the use of conventional methods of infertility treatment in this environment; hence, the current advocacy for the use of ART to solve the problem of male factor infertility in Nigeria.[1]

The higher prevalence of abnormal sperm motility of 83.3% obtained in this study was far higher than 44%[6] and 60%[12] reported by other workers in Nigeria. The availability of intracytoplasmic sperm injection facility in our center which overcome the problems of male factor infertility accounted for increasing referral

Table 3: Determinants of infertility among male partners of infertile couple (*n*=312)

Variables	Type of infertility (%)		χ^2	OR	95% CI	φ	*P*
	Primary	Secondary					
Age (years)							
≤40	72 (45.3)	87 (54.7)	9.12	2.05	1.25-3.37	0.171	0.003
>40	44 (28.8)	109 (71.2)					
Social class							
High	2 (25.0)	6 (75.0)	0.52	0.56	0.08-3.11	0.041	0.715*
Low/middle	114 (37.5)	190 (62.5)					
Infertility duration (years)							
1-10	96 (38.4)	154 (61.6)	0.80	1.31	0.70-2.47	0.051	0.370
>10	20 (32.3)	42 (67.7)					
Semen analysis							
Normal	58 (34.3)	111 (65.7)	1.29	0.77	0.47-1.25	0.064	0.256
Abnormal	58 (40.6)	85 (59.4)					
Pus cells							
Present	58 (36.9)	99 (63.1)	0.01	0.98	0.60-1.59	0.006	0.931
Absent	58 (37.4)	97 (62.6)					
Hormonal profile							
Normal	78 (39.3)	120 (60.7)	1.14	1.30	0.78-2.17	0.061	0.286
Abnormal	38 (33.3)	76 (66.7)					
Prolactin							
Normal	87 (34.9)	162 (65.1)	2.65	0.63	0.35-1.14	0.092	0.104
Abnormal	29 (46.0)	34 (54.0)					

*Fisher exact, φ: Phi coefficient. OR: Odds ratio, CI: Confidence interval

of male factors infertility to the unit all over the country. Moreover, the findings of significant association between age and types of infertility were similar to the report of Paasch *et al*.[18] in 2010 as age-related testicular alteration have been shown to be associated with poorer semen quality. More so, the insignificant association between semen analysis, hormone profile, and serum prolactin observed in this study is in consonance with earlier report in Benin, Nigeria.[2]

The insignificant association between the types of infertility and leukocytospermia has been documented by Lackner *et al*.,[19] which shows that leukocytospermia may not necessarily have a negative impact on the outcomes following assisted reproductive techniques. They reported similar fertilization rates for nonleukocytospermic samples and leukocytospermic samples (63.4% vs. 64.3%, $P < 0.005$). Corresponding pregnancy rates also did not differ significantly between the two groups.

The findings in this study of a high level of leukocytospermia and bacterial infections in both normospermic and oligospermic semen were similar to the findings of the study in Ile-Ife, Nigeria.[15] Male genital tract infection is an important etiological factor leading to the deterioration of spermatogenesis, impairment of sperm function, and/or obstruction of seminal tract.

CONCLUSION

The prevalence of abnormal semen quality of male partners of infertile couple is high in Ilorin. Therefore, there is an urgent need to scale-up the awareness of populace on male factor input in infertility and improve community mobilization toward increasing male participation and involvement to facilitate early presentation at fertility center for optimal care which ultimately will lead to reduce stigmatization and ostracizing women for infertility.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Orhue AA. From barrenness to abundance of the fruits of the womb: The role of medical science in the fulfillment of the divine injunction, Inaugural lecture series 131. Benin City, Nigeria: University of Benin Press, University of Benin; 2013. p. 5.
2. Benjamin UO, Akhere TI, Orhue AA. The prevalence and patterns of endocrinopathies amongs azoospermic male partners at a fertility clinic in Benin city. Endocrinol Metab Int J 2014;1:1-6.
3. Agu O, Ibrahim SA, Muhammed Z. Determination of the semen quality in male partners of infertile couples in Aminu Kano Teaching Hospital, Kano: A three year review. Ibom Med J 2011;4:17-22.
4. Idrisa A, Ojiyi E. Pattern of infertility in North Eastern Nigeria. Trop J Obstet Gynaecol 2000;17:27-9.
5. Imade GE, Sagay AS, Pam IC, Ujah IOA, Daru PH, Daru. Seminal quality in male partners of infertile couples in Jos, Nigeria. Trop J Obstet Gynaecol 200;17:24-6.
6. Ugboma HA, Obuna JA, Ugbonma EW. Pattern of seminal fluid analysis among infertile couples in a secondary health facility in South-Eastern Nigeria. Res Obstet Gynecol 2012;1:15-8.
7. Otubu JAM. Infertility. In: Agboola A, editor. Textbook of Obstetrics and Gynaecology for Medical Student's. Vol. 1. Lagos: University Services Educational Publishers Limited; 1998. p. 172-88.
8. Bhattacharya S. Infertility. In: Edmonds DK, editor. Dewhurst's Textbook of Obstetrics & Gynaecology for Postgraduates. 7th ed. London: Oxford Blackwell Publishing; 2007. p. 440-60.
9. Macleod J, Gold RZ. The male factor in fertility and infertility. II. Spermatozoon counts in 1000 men of known fertility and in 1000 cases of infertile marriage. J Urol 1951;66:436-49.
10. Kruger TF, Menkveld R, Stander FS, Lombard CJ, Van der Merwe JP, van Zyl JA, *et al.* Sperm morphologic features as a prognostic factor in *in vitro* fertilization. Fertil Steril 1986;46:1118-23.
11. World Health Organization. WHO Laboratory Manual for the Examination and Processing of Human Semen. 5th ed. Switzerland: Cambridge University Press; 2010.
12. Olatunji AO, Sule-Odu AO. The pattern of infertility cases at a university hospital. West Afr J Med 2003;22:205-7.
13. Mandong BM. Histological pattern of testicular biopsies in Nigerian men (undergoing investigations for infertility in Jos, Nigeria). Highland Med Res J 2002;1:7-8.
14. Omokanye LO, Olatinwo AWO, Durowad KA, Panti AA, Salaudeen AG, Adewara EO. A review of pregnancy outcomes following Laparoscopic ovarian drilling for infertile women with clomiphene resistant Polycystic Ovarian Syndrome (PCOS) at a public health facility in Ilorin, Nigeria. Trop J Obstet Gynaecol 2014;31:74-81.
15. Owolabi AT, Fasubaa OB, Ogunniyi SO. Semen quality of male partners of infertile couples in Ile-Ife, Nigeria. Niger J Clin Pract 2013;16:37-40.
16. Adeniji RA, Olayemi O, Okunlola MA, Aimakhu CO. Pattern of semen analysis of male partners of infertile couples at the University College Hospital, Ibadan. West Afr J Med 2003;22:243-5.
17. Akinola OI, Fabamwo AO, Rabiu KA, Akinoso OA. Semen quality in male partners of infertile couples in Laos Nigeria. Int J Trop Med 2010;5:37-9.
18. Paasch U, Grunewald S, Kratzsch J, Glander HJ. Obesity and age affect male fertility potential. Fertil Steril 2010;94:2898-901.
19. Lackner JE, Märk I, Sator K, Huber J, Sator M. Effect of leukocytospermia on fertilization and pregnancy rates of artificial reproductive technologies. Fertil Steril 2008;90:869-71.