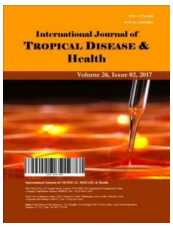

International Journal of TROPICAL DISEASE & Health

28(1): 1-7, 2017; Article no.IJTDH.36788
ISSN: 2278–1005, NLM ID: 101632866

Male Pattern Infertility in a Referral Hospital, Southern Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OIL and WKT designed the study and wrote the protocol. Authors OIL and LSD wrote the first draft of the manuscript and managed the literature searches. All authors managed the analyses of the study, read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2017/36788
Editor(s):
(1) Ravindra Nath Sharma, St. George's University, West Indies.
(2) Andrea Ottonello, University of Genoa, Italy.
(3) Shankar Srinivasan, University of Medicine & Dentistry of New Jersey, USA.
Reviewers:
(1) Wagih Mommtaz Ghannam, University of Mansoura, Egypt.
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(4) O. Wai Sum, University of Hong Kong, United Kingdom.
(5) Samsudeen Gbenga Ojuolape, University Abubakar Tafawa Balewa, Nigeria.
Complete Peer review History: http://www.sciencedomain.org/review-history/22251

Original Research Article

Received 15th September 2017
Accepted 25th November 2017
Published 11th December 2017

ABSTRACT

Aim: To evaluate the pattern of seminal fluid parameters (sperm concentration, motility and morphology) observed on seminal fluid analysis.
Study Design: A Retrospective study.
Place and Duration of Study: The Department of Medical Microbiology and Parasitology of University of Port Harcourt Teaching Hospital, Rivers state, Nigeria over a five year period between 1st January 2010 and 31st December 2015.
Methodology: Retrospective review of seminal fluid analysis. Data collated include sperm concentration, motility and morphology as well as age. No contact with patients was necessary. Seminal fluid analysis was carried out using 2010 WHO recommended criteria. Data was presented using measures of central tendency and analysed using the epi info v7 software at a 95% confidence interval and *P* value < 0.05 was considered significant.

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Results: A total of 223 semen samples analysed during the period under review. 39% (87) and 1.8% (4) had oligozoospermia and azoospermia respectively, 87.4% (195) had varying degrees of morphologic abnormality of their sperm cells and 40.8% (91) had ≤40% progressive motility. 85.7% (78) men who had ≤40% motility also had structural abnormalities of their spermatozoa, implying poor seminal fluid quality

Conclusion: Male factor infertility may contribute significantly to the number of infertile couples diagnosed in Southern Nigeria. The impact on younger men is huge. We therefore encourage more studies to better evaluate associated/ causative factors including the impact of environmental factors (in the light of recent changes in the ecosystem) with a view to reducing its incidence.

Keywords: Semen analysis; male infertility; Port Harcourt.

1. INTRODUCTION

Infertility is the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse [1]. It is quite common, with prevalence of 8-12% and affecting 60–80 million couples worldwide [2]. In Nigeria, prevalence rates ranging from 4 to 48.1% have been reported [3,4,5].

Infertility has also be defined as failure of couple to conceive after 12 months of regular intercourse without the use of contraception in women <35 years; and after 6 months of regular intercourse without the use of contraception in women ≥35 years [6]. This definition seems to focus on females who are also commonly blamed for infertility particularly in the African setting, however male factor infertility which refers to a male's inability to impregnate a fertile female is reported to contribute as much as 40-50% of cases of infertility as up to 7% of all men exhibit suboptimal sperm parameters [2].

Agarwal et al. [7] reported that estimated rates in Sub-Saharan Africa are close to some of the higher percentages of male infertility estimated worldwide. Though alarming, these figures may not even fully represent the true picture as the African male tends to assume the dominant position in both the community and the family and so neither report their infertility nor seek help, as they believe it is emasculating to be unable to impregnate a woman.

The causes are unknown in many cases of male infertility. This is referred to as idiopathic infertility, About 30 percent of men who seek medical attention due to infertility are reported to have oligozoospermia or azoospermia of unknown aetiology [8].

Male infertility however results from a variety of pathogenic mechanisms including pre-testicular, testicular, and post-testicular factors [9]. The causes may be congenital or acquired and include congenital abnormalities (cryptochordism), chromosomal disorders (specifically abnormalities of the Y chromosome), genital tract infections leading to obstructive oligozoospermia/ azoospermia, drugs, use of alcohol and tobacco, abuse of cannabis, and wearing of tight underwear [10,11,12].

An objective assessment of male fertility requires laboratory examination of seminal fluid known as seminal fluid analysis (SFA). SFA which assesses the production, development and function of spermatozoa has been shown to be very useful as it has shown good correlation with male fertility with sensitivity as high as 89.6% [13].

Males with sperm parameters below normal values as recommended by the 2010 WHO criteria are considered to have male factor infertility [14]. This is commonly observed as either low concentration of sperm cells in semen (oligozoospermia), morphological abnormality of the spermatozoa (teratozoospermia), abnormal sperm motility (asthenozoospermia) or a combination of factors [15,16]. Recent data suggest a decline in semen quality across various geographical areas [13,17].

This study was carried out to evaluate the pattern of seminal fluid parameters (sperm concentration, motility and morphology) observed in the department of Medical Microbiology and Parasitology of the University of Port Harcourt Teaching Hospital over a five year period.

2. METHODOLOGY

The study is a retrospective review of semen analysis carried out in the department of Medical

Microbiology and Parasitology of University of Port Harcourt Teaching Hospital, Rivers state, Nigeria, over five years between 1st January 2010 and 31st December 2015.

Data collated include sperm concentration, sperm motility and morphology of the spermatozoa as well as clients' age.

Clients were instructed to abstain from sexual intercourse or masturbation for a minimum of three days. Thereafter, semen specimens were collected by masturbation into sterile, leak-proof universal containers and delivered to the laboratory within one hour of collection. Seminal fluid analysis was carried out using 2010 WHO recommended protocol/criteria [14] Sperm concentrations of less than 20 x 10^6 and less than 1 x 10^6 were reported as oligozoospermia and azoospermia respectively. No contact with patients was necessary.

Data was presented using measures of central tendency (mean, frequency and percentage). The Students' t test was used to determine difference in mean age of two groups. Odds ratio was used to determine likelihood of abnormal sperm and oligozoospermia in the affected groups. The chi-square statistic was used to assess the differences in azoospermia, oligozoospermia and normal sperm concentration within the age groups. All analysis was done with the Epi Info v7 software at a 95% confidence interval and *P* value < 0.05 was considered significant.

3. RESULTS

A total of 223 semen samples were analyzed. Patients were within the age range of 22 – 67 years with mean age of 37.2 ± 8.1 years and modal age of 35 years. The majority of patients (60.1%) were between 30 and 39 years of age, closely followed by those 40 – 49 years old (23.3%) (Table 1).

Among these, 59.2% (132) had normal sperm concentration while 39% (87) and 1.8% (4) had oligozoospermia and azoospermia respectively.

The majority of patients with abnormal sperm counts were between 30 and 39 years of age. They include 60.9% (53) of men with oligozoospermia and 50% (2) of those with azoospermia, however, the difference was not statistically significant. The likelihood of abnormal sperm count was albeit higher in the age range 50 – 59 years (Table 2).

Table 1. Age distribution of subjects

Age groups (Years)	Frequency (%) N=223
18-29	21 (9.4)
30-39	138 (61.9)
40-49	50 (22.4)
50-59	11 (4.9)
≥60	3 (1.4)
Total	223 (100.0)

87.4% (195) of men had varying degrees of anatomical abnormality of their sperm cells (teratozoospermia) (Fig. 1) with the likelihood of having abnormal sperm cells being highest among 40 – 49 year olds followed closely by those 30- 39years of age (Table 3).

The mean age of patients with abnormal sperm morphology was 37 ±10.7 years which is higher than 35.2 ± 7.9 years for those with normal sperm morphology; however, this difference was not statistically significant (Table 4).

There were various morphologic abnormalities observed, their distribution across the various age groups is represented in the Fig. 2.

91 (40.8%) had ≤40% motility while 132 (59.2%) had ≥40% motility. Among those with ≤40% motility, 85.7% also had abnormal spermatozoa (Table 5).

Table 2. Age-specific distribution of sperm concentration

Age group (Years)	Normal (N, %)	Azospermia (N, %)	Oligospermia (N, %)	χ^{2*} (*P* Value)	OR (95% CI)
18-29	17 (12.9)	0 (0.0)	4 (4.6)	4.64 (.10)	0
30-39	80 (60.6)	2 (50.0)	53 (60.9)	0.19 (.91)	0.6 (0.1-4.7)
40-49	23 (17.4)	1 (25.0)	23 (26.4)	2.59 (.27)	0.9 (0.1–9.3)
50-59	7 (5.3)	1 (25.0)	6 (6.9)	2.91 (.23)	4.5 (0.4-50.1)
≥60	5 (3.8)	0 (0.0)	1 (1.1)	1.51 (.47)	0
Total	132 (100.0)	4 (100.0)	87 (100.0)		

$\chi 2$ = Chi-square statistic

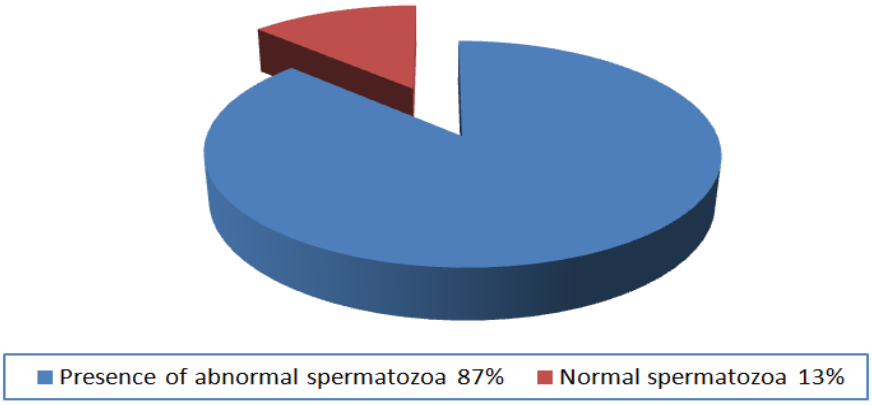

Fig. 1. Pattern of sperm morphology observed

Table 3. Distribution of sperm morphology by age group

Age group (Years)	Normal (N, %)	Abnormal (N, %)	Total (N, %)	OR* (95% CI**)
18-29	4 (14.3)	17 (8.7)	21 (9.4)	0.5 (0.1-1.8)
30-39	15 (53.6)	123 (63.1)	138 (61.9)	1.4 (0.6 – 3.2)
40-49	4 (14.3)	46 (23.6)	50 (22.4)	1.8 (0.6 – 5.6)
50-59	3 (10.7)	8 (4.1)	11 (4.9)	0.3 (0.1 – 1.4)
≥60	2 (7.1)	1 (0.5)	3 (1.4)	0.1 (0.01 -0.7)
Total	28 (100.0)	195 (100.0)	223 (100.0)	

**Odds Ratio, **Confidence interval*

Table 4. Difference in mean age of subjects with normal and abnormal sperm morphology

Normal	Abnormal	T-test (*P* Value)
35.2±7.9	37±10.7	0.7743

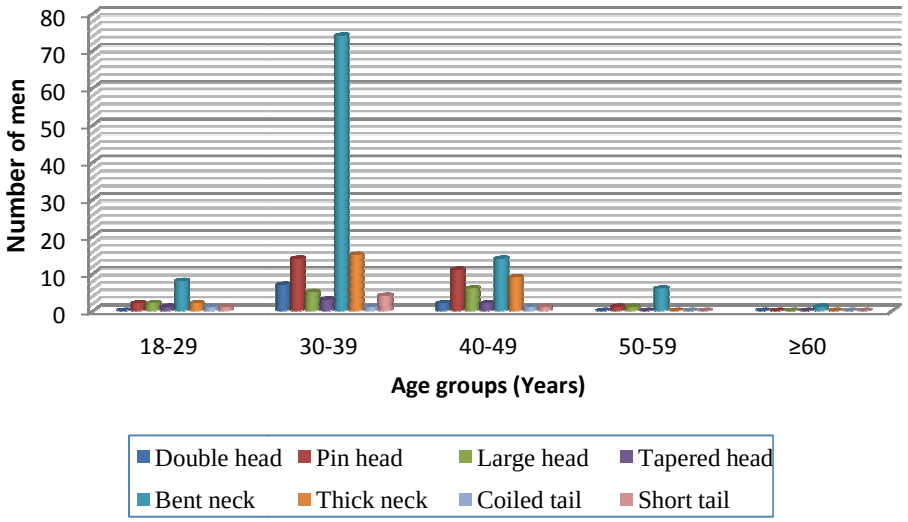

Fig. 2. Distribution of sperm cell abnormalities observed across different age groups

The age-specific distribution of sperm motility as presented in Table 6 indicates that the majority of men with poor motility were within age 30 - 49, however the proportion within the age groups was higher in the older men of over 50 years, this difference being statistically significant.

Table 5. Pattern of sperm motility in relation to morphology of sperm cells

Motility (%)	Sperm morphology (n, %)		χ^{2*} (*P* value)
	Normal	Abnormal	
≤40%	13 (46.4)	78 (40)	
≥40%	15 (53.6)	117 (60)	0.41 (.52)
Total	28 (100.0)	195 (100.0)	

**Chi-square statistic*

Table 6. Age-specific distribution of sperm motility

Age group (Years)	Motility		χ^{2*} (*P* value)
	≥40%	≤40%	
18-29	17 (12.9)	4 (4.4)	
30-39	89 (67.4)	49 (53.8)	11.94 (.02)
40-49	20 (15.2)	30 (33.0)	
50-59	5 (3.7)	6 (6.6)	
≥60	1(0.8)	2 (2.2)	
Total	132 (100.0)	91 (100.0)	

***** *Chi-square statistic*

4. DISCUSSION

Abnormal sperm concentration (oligozoospermia and azoospermia), poor seminal fluid quality or a combination of these, are reported to account for as much as 90% of infertility among males [18]. In our study, about 41% (91) of men studied had abnormal sperm concentration. Since our laboratory form does not provide a specific slot for stating whether patients were infertile or not, we could not determine what proportion of men had clinical primary or secondary infertility, however, the provisional/ clinical diagnoses for which patients were referred were largely due to infertility/ related issues.

Various studies suggest a relationship between age and seminal fluid parameters, more in favour of reduced sperm quality particularly with respect to sperm morphology and motility after age 50 years when compared with younger men of about age 30 years [19,20]. In our centre, the majority of men who presented for SFA i.e. 186 (83.4%), and majority of those with abnormal sperm concentration 169 (90.9%) were within the age range of 30 – 49 years.

The impact of age on male fertility is probably due to reduced function of the testes over time. The percentage of seminiferous tubules containing spermatids is reported to decrease with age from about 90% in men between 30 and 40 years to about 50% in men about 40-50 years [21].

Studies have suggested that sperm morphology also changes with age so teratozoospermia is more likely with increase in age because a decline in normal sperm morphology by 0.2–0.9% tends to occur each year [2,16]. We observed that about 87% (195) of men studied had some structural abnormality in their spermatozoa; however, the mean age for these men was 37 ±10.7 years. Could this imply that teratozoospermia is becoming more common in younger men in our environment?

The motility of spermatozoa which is a vital function necessary for it to penetrate cervical mucus and ascend to fertilize the ovum, without which pregnancy cannot result, is also reported by various studies to decrease by about 0.17–0.6% each year of a man's life [22,2]. In our study, 91 (40.8%) men had ≤40% motility which is consistent with WHO diagnostic criteria for male infertility; among these, 85.7% (78) also had structural abnormalities implying overall poor seminal fluid quality. Though more of those with asthenozoospermia were within 30 – 49 years of age, the proportion of these men per age group significantly increased with age and so is in agreement with earlier reports [22].

While the cause of infertility is unknown in some cases, some factors other than age that are believed to affect semen quality include environmental factors such as wearing of tight and nylon underwear and working in environments where the testicles are exposed to high temperatures. Abnormalities of the male genital tract such as cryptorchidism and testicular cancer as well as poor nutrition have also been implicated. In recent times, the average environmental temperature in Nigeria has been on the increase being often times almost "unbearable" and so has the rates of malignancies [23]; these may be contributing to the incidence of male infertility especially among younger men in our environment.

5. CONCLUSION

Male factor infertility may contribute significantly to the number of infertile couples diagnosed in Southern Nigeria. The impact on younger men is huge. We therefore encourage more studies to better evaluate associated/ causative factors including the impact of environmental factors (in

the light of recent changes in the ecosystem) with a view to reducing its incidence.

CONSENT

Consent is not applicable.

ETHICAL APPROVAL

Ethical approval is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Zegers-Hochschild F, Adamson GD, de Mouzon J, Ishihara O, Mansour R, Nygren K, et al. International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary of ART terminology. Fertil Steril. 2009;92:1520–4.
2. Kumar N, Singh AK. Trends of male factor infertility, an important cause of infertility: A review of literature. Journal of Human Reproductive Sciences. 2015;8(4):191-196. DOI: 10.4103/0974-1208.170370
3. Abiodun OM, Balogun OR, Fawole AA. Aetiology, clinical features and treatment outcome of intrauterine adhesion in Ilorin, Central Nigeria. West Afr J Med. 2007;26: 298-301.
4. Adeyemi AS, Adekanle DA, Afolabi AF. Pattern of gynaecological consultations at Ladoke Akintola University of Technology Teaching Hospital. Niger J Clin Pract. 2009;12:47-50.
5. Obuna JA, Ndukwe EO, Ugboma HA, Ejikeme BN, Ugboma EW. Clinical presentation of infertility in an outpatient clinic of a resource poor setting, South East Nigeria. Int J Trop Disease and Health. 2012;2:123-31.
6. Practice Committee of the American Society for Reproductive Medicine. Definitions of infertility and recurrent pregnancy loss. Fertil Steril. 2008; 90(5 Suppl): S60.
7. Agarwal A, Mulgund A, Hamada A, Chyatte MR. A unique view on male infertility around the globe. Reproductive Biology and Endocrinology. 2015;13:37. DOI: 10.1186/s12958-015-0032-1
8. Poongothai J, Gopenath TS, Manonayaki S. Genetics of human male infertility. Singapore Med J. 2009;50(4):336-47.
9. Wamoto TI, Nozawa S, Yoshiike M. Semen quality of Asian men. Reprod Med Biol. 2007;6:185–93.
10. Gannon JR, Walsh TJ. The epidemiology of male infertility. In Biennial Review of Infertility. Springer International Publishing. 2015;3-7.
11. Pacey AA, Povey AC, Clyma JA, McNamee R, Moore HD, Baillie H, Cherry NM. Modifiable and non-modifiable risk factors for poor sperm morphology. Human Reproduction. 2014;29(8):1629-36. DOI: 10.1093/humrep/deu116
12. Jungwirth A, Giwercman A, Tournaye H, Diemer T, Kopa Z, Dohle G, Krausz C, EAU Working Group on Male Infertility. European Association of Urology guidelines on male infertility. European Urology. 2012;62(2): 324-32.
13. Butt F, Akram N. Semen analysis parameters: Experiences and insight into male infertility at a tertiary care hospital in Punjab. J Pak Med Assoc. 2013;63:558–62.
14. Cooper TG, Noonan E, von Eckardstein S, Auger J, Baker HW, Behre HM, et al. World Health Organization reference values for human semen characteristics. Hum Reprod Update. 2010;16:231–45.
15. Juul A, Almstrup K, Andersson AM, Jensen TK, Jørgensen N, Main KM, Rajpert-De Meyts E, Toppari J, Skakkebæk NE. Possible fetal determinants of male infertility. Nature Reviews Endocrinology. 2014;10:553-62.
16. Harris ID, Fronczak C, Roth L, Meacham RB. Fertility and the aging male. Rev Urol. 2011;13:e184–90.
17. Chuang H, Baishun L, Kongrong X, Dan L, Jing H, Yang Y, HongChuan N, Liqing F, Wenbing Z. Decline in semen quality among 30,636 young Chinese men from 2001 to 2015. Fertility and Sterility. 2017;107(1):83-8.
18. Sabra SM, Al-Harbi MS. An influential relationship of seminal fluid microbial infections and infertility, Taif Region, KSA. World J Med Sci. 2014;10:32–7.
19. Kidd SA, Eskenazi B, Wyrobek AJ. Effects of male age on semen quality and fertility: A review of the literature. Fertil Steril. 2001;75(2):237-48.
20. Levitas E, Lunenfeld E, Weisz N, Friger M, Potashnik G. Relationship between age and

semen parameters in men with normal sperm concentration: Analysis of 6022 semen samples. Andrologia. 2007;39(2):45-50.
21. Sasano N, Ichijo S, Tohoku J. Vascular patterns of the human testis with special reference to its senile changes. Exp Med. 1969;99(3):269-80.
22. Fisch H, Goluboff ET, Olson JH, Feldshuh J, Broder SJ, Barad DH. Semen analyses in 1,283 men from the United States over a 25-year period: No decline in quality. Fertil Steril. 1996;65(5):1009-14.
23. Elima Jedy-Agba, Maria Paula Curado, Olufemi Ogunbiyi, Emmanuel Oga, Toyin Fabowale, Festus Igbinoba, et al. Cancer incidence in Nigeria: A report from population-based cancer registries. Cancer Epidemiol. 2012;36(5):e271–e278. DOI: 10.1016/j.canep.2012.04.007

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/22251