

# **Original Research Article**

## **MALE PATTERN INFERTILITY IN A REFERRAL HOSPITAL, SOUTHERN NIGERIA**

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### **Abstract**

#### **Aim:**

To determine the sero-prevalence of recent *Toxoplasma gondii* infection using IgG avidity Enzyme-linked immunosorbent assay (ELISA) among pregnant women in the University of Port Harcourt Teaching Hospital, Nigeria

**Study design:** A cross-sectional study

**Place and Duration of Study:** Department of Medical Microbiology and Parasitology and Department of Obstetrics and Gynaecology, University of Port Harcourt Teaching Hospital (UPTH), Rivers State, Nigeria between January and June 2013.

**Methodology:** Involved two hundred and eighty-eight (288) pregnant women in their first trimester who gave informed consent. Questionnaires were administered to determine socio-demographic factors. Enzyme-linked immunosorbent assay (ELISA) was performed on all women's sera to detect anti-*Toxoplasma* Immunoglobulin G (IgG) and Immunoglobulin M (IgM) and the sero-positive samples were subjected to IgG Avidity ELISA. Data was analyzed using the statistical package Epi info version 6.04d.

**Results:** A total of one hundred and eighty-nine (65.6 %) pregnant women were sero-positive for IgM and IgG among which thirty-three (11.5%) were positive for IgM only, Three (1.6%) among the one hundred and eighty-nine had low IgG avidity percentage while one hundred and eighty-six (98.4%) had high IgG avidity percentage giving a 1.04% sero-prevalence of recent infection among these pregnant women.

**Conclusion:** One in every two pregnant women had been exposed; however, though only a small fraction of these were possibly recent infections, measures to prevent maternal toxoplasmosis in pregnancy as well as diagnose recent infections should be optimised due to the potential for congenital infection with its grave socio-medical implications. The IgG avidity test could therefore, be useful in avoiding unnecessary treatment for Toxoplasmosis in pregnancy.

**Key Words**\_ Recent infection; *Toxoplasma gondii*; Pregnancy; Immunoglobulin G avidity ELISA

## 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 reports of about 8-12% prevalence with estimates of 60–80 million couples affected worldwide[2] and 4 to 48.1% in Nigeria [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 the female and Females are 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 will exhibit suboptimal sperm parameters[2] .

The causes are unknown in majority of cases of male infertility, however, male infertility results from a variety of pathogenetic mechanisms including pre-testicular, testicular, and post-testicular factors[7] which include Congenital abnormalities (cryptorchidism), chromosomal disorders, genital tract infections leading to obstructive oligospermia/ azoospermia, drugs, use of Alcohol and tobacco, abuse of cannabis, and wearing of tight underwear[8,9,10].

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% [11].

Males with sperm parameters below normal values as recommended by the WHO are considered to have male factor infertility[12]. This is commonly observed as either low concentration of sperm cells in semen (oligospermia), morphological abnormality of the spermatozoa (teratozoospermia), abnormal sperm motility (asthenospermia) or a combination of factors[13,14]. Recent data suggest a decline in semen quality worldwide [11].

This study was carried out to evaluate the pattern of seminal fluid parameters 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 desk 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 a five year period between 1st January 2010 and 31st December 2015.

Data collated include sperm count, sperm motility and structural abnormalities of the spermatozoa.

74 Seminal fluid analysis was carried out using WHO recommended protocol/criteria. Semen concentrations of less than 20 x  
 75 10<sup>6</sup> and less than 1 x 10<sup>6</sup> were reported as oligospermia and azoospermia respectively. No contact with patients was  
 76 necessary.

77 Data was presented using measures of central tendency (mean, frequency and percentage). The T-test was used to  
 78 determine difference in mean age of two groups. Odds ratio was used to determine likelihood of abnormal sperm and  
 79 oligospermia in the affected groups. The chi-square statistic was used to assess the differences in azospermia,  
 80 oligospermia and normal sperm count within the age groups. All analysis was done with the Epi Info v7 software at a 95%  
 81 confidence interval and *P* value < 0.05 was considered significant.

82  
 83 **3. RESULTS**  
 84

85 A total of 223 semen samples were analyzed. Patients were within the age range of  
 86 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  
 87 between 30 and 39 years of age, closely followed by those 40 – 49 years old (23.3%) (Table 1)  
 88

89 **Table 1: Age distribution of subjects**

| Age Groups<br>(Years) | Frequency (%)<br>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)              |

90  
 91 Among these, 59.2% (132) had normal sperm counts while 39% (87) and 1.8% (4) had oligospermia and azospermia  
 92 respectively.

93 The majority of patients with abnormal sperm counts accounting for 60.9% (53) of men with oligospermia and 50% (2) of  
 94 those with azospermia were between 30 and 39 years of age, however, the differences in sperm count according to age

groups was not statistically significant. The likelihood of abnormal sperm count was albeit higher in the age range 50 – 59 years (Table 2)

**Table 2: Age-specific distribution of sperm count**

| Age Group<br>(Years) | Normal<br>(N, %) | Azospemia<br>(N, %) | Oligospermia<br>(N, %) | $\chi^2$ (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

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).

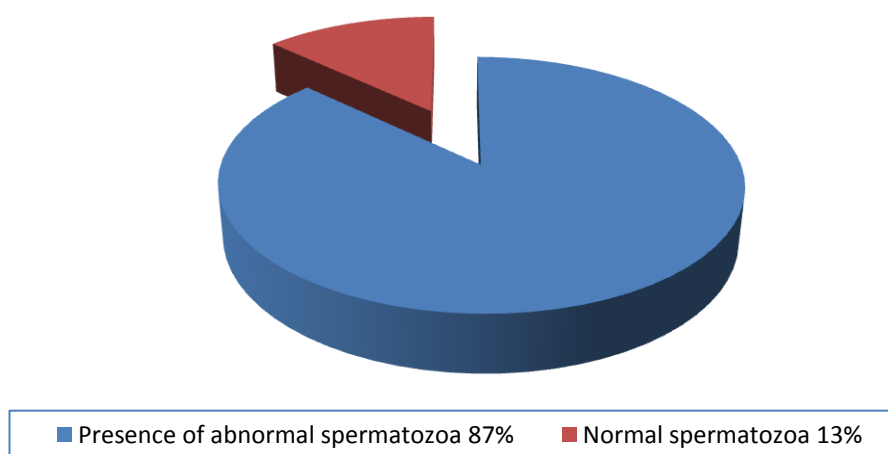


**Fig. 1: Pattern of sperm morphology observed**

108 **Table 3: Distribution of Sperm Morphology by age group**

| Age Group<br>(Years) | Normal<br>(N, %) | Abnormal<br>(N, %) | Total<br>(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

110 The mean age of patients with abnormal sperm cells was  $37 \pm 10.7$  years which is higher than  $35.2 \pm 7.9$  years for those  
 111 with normal sperm count; however, this difference was not statistically significant (Table 4)

113 **Table 4: Difference in mean age of subjects with normal and abnormal sperm cells**

| Normal   | Abnormal | T-test ( <i>P</i> Value) |
|----------|----------|--------------------------|
| 35.2±7.9 | 37±10.7  | 0.7743                   |

115 98 (43.9%) had ≤40% motility while 125 (56.1%) had ≥ 40% motility. Among those with ≤40% motility, 86.7% also had  
 116 abnormal spermatozoa (Table 5).

118 **Table 5: Pattern of Sperm Motility in relation to Morphology of sperm cells**

| Motility Range<br>(%) | Sperm Morphology (n, %) |             | $\chi^2$ * ( <i>P</i> value) |
|-----------------------|-------------------------|-------------|------------------------------|
|                       | Normal                  | Abnormal    |                              |
| ≤40%                  | 13 (46.4)               | 78 (40)     | 0.41 (.52)                   |
| ≥40%                  | 15 (53.6)               | 117 (60)    |                              |
| Total                 | 28 (100.0)              | 195 (100.0) |                              |

\*Chi-square statistic

The age-specific distribution of sperm motility as presented in table 6 indicates that the bulk of men with poor motility were within ages 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 6: Age-specific distribution of sperm motility**

| Age Group<br>(Years) | Motility    |            | $\chi^2$ (P value) |
|----------------------|-------------|------------|--------------------|
|                      | ≥40%        | ≤40%       |                    |
| 18-29                | 17 (12.9)   | 4 (4.4)    | 11.94 (.02)        |
| 30-39                | 89 (67.4)   | 49 (53.8)  |                    |
| 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 counts (oligospermia and azospermia), poor seminal fluid quality or a combination of these are reported to account for as much as 90% of infertile males[15]. In our study, about 41% (91) of men studied had abnormal sperm counts. 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[16,17]. In our centre, the majority of men being 186 (83.4%) who presented for SFA, and the bulk of those with abnormal sperm concentration being 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 male genital organs over time as 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[18].

162 Studies have suggested that sperm morphology also changes with age so teratozoospermia is more likely with increase in  
 163 age because a decline in normal sperm morphology of 0.2–0.9% tends to occur each year[2,14]. We observed that about  
 164 87% (195) of men studied had some structural abnormality in their spermatozoa; however, the mean age for these men  
 165 was 37 ±10.7 years. Could this imply that teratozoospermia is becoming more common in younger men in our  
 166 environment?

167 The motility of spermatozoa which is a vital function necessary for it to penetrate cervical mucus and ascend to fertilization  
 168 of the ovum, without which pregnancy cannot result, is also reported by various studies to decrease by about 0.17–0.6%  
 169 each year of a man's life[19,2]. In our study, 91 (40.8%) men had ≤40% motility which is consistent with WHO diagnostic  
 170 criteria for male infertility; among these men who had ≤40% motility, 85.7% (78) also had structural abnormalities implying  
 171 overall poor seminal fluid quality. Though more of those with poor sperm motility were within 30 – 49 years of age, the  
 172 age-specific proportion of these significantly increased with increasing age and so is in agreement with earlier reports[18].  
 173 While the cause of infertility in some cases is unknown, some factors other than age that are believed to affect semen  
 174 quality include environmental factors such as wearing of tight and nylon underwear, working in environments where the  
 175 testicles are exposed to high temperatures, abnormalities of the male genital tract such as cryptorchism and testicular  
 176 cancer as well as poor nutrition. In recent times, the average environmental temperature in Nigeria has been on the  
 177 increase being often times almost “unbearable” and so has the rates of malignancies[20]; these may be contributing to the  
 178 incidence of male infertility especially among younger men in our environment.

## 179 5. CONCLUSION 180

181 Male factor infertility may contribute significantly to infertility cases diagnosed in Southern Nigeria. The impact on younger  
 182 men is huge therefore more studies are encouraged to better evaluate contributory factors to male infertility in Nigeria,  
 183 including the impact of environmental factors in the light of recent changes in the ecosystem, with a view to reducing its  
 184 incidence.  
 185  
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## 187 **COMPETING INTERESTS**

188 No competing interests exist

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## 191 **CONSENT (WHERE EVER APPLICABLE)**

192 No contact made with patients so not applicable

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## 194 **ETHICAL APPROVAL (WHERE EVER APPLICABLE)**

195 Not applicable

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