

Original Article

Contribution of Bacterial Infection to Male Infertility in Nigerians

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Abstract:

There is disagreement as to the influence of certain microbial infection on male infertility and such agents are ignored. The incidence of these microbial agents in seminal fluid isolates is on the increase. This study therefore evaluates the prevalence of male factor infertility and contribution of microbial infection to male infertility in Kano, northern Nigeria. Seminal fluid analysis in five hundred males who were investigated for infertility was evaluated using the 5th generation SQ All C-P sperm quality analyzer and the Neubauer counting chamber. The result indicates that 58.2% had sperm density less than twenty million per millilitre. The oligospermic subjects (sperm density 2-19 millions/ml) were 27.6%, severe oligospermic (sperm density less than 2 million) 13.2% and azoospermia, 17.4%. Asthenospermia (motility less than 50%) decrease from 44.8% in oligospermia to 24.0% in severe oligospermia. Teratospermia (abnormal morphology greater than 50%) also deteriorated from 46.3% to 35.4% in oligospermic and severe oligospermic males respectively. Seminal fluid infection increases with decreasing sperm density, motility and morphology. The prevalence of abnormal sperm indices and bacterial infection is high and *Staphylococcus aureus* infection should be treated and no longer ignored in the management of male factor infertility.

Key Words: Male infertility, oligospermia, severe oligospermia, azoospermia infection

Introduction:

There is disagreement as to the influence of certain microbial infection on male infertility. Several investigators have reported difference types of organisms in seminal fluid specimens depending on the methods of examination.¹ It was reported that detection of bacteria in semen does not necessarily suggest infection since bacteria isolates in seminal fluid may represent contamination, colonization of the urethral orifice or infection. *Chlamydia trachomatis*, *Ureaplasma urealyticum* and enterobacteria are the most frequently isolated organisms in industrialized countries.² In eastern and southern parts of Nigeria, oligospermia and azospermia are the common causes of male factor infertility which has been attributed to bacterial infections.³⁻⁴

According to the World Health Organisation (WHO)⁵, seminal fluid infection was defined as the presence of significant bacteriospermia ($\geq 10^3$ bacteria/ml ejaculate), detection of *Neisseria gonorrhoeae*, *C. trachomatis*, *U. urealyticum*; significant leukocytospermia (10^6 peroxidase positive leukocyte/ml ejaculate). It therefore follows that if some or all the conditions above are not met, the isolation of bacteria in semen are often regarded as contaminants by most practitioners. The prevalence of male factor infertility in sub-Saharan Africa is on the increase.⁶⁻⁷ This study is therefore aimed at determining the prevalence and role of bacteria infection in male factor infertility in Kano, northern Nigeria.

Material and Methods:

Five hundred seminal fluid specimens from men investigated for infertility over a period of 4 years were analyzed. These were seminal fluids of patients referred to the laboratory from the fertility clinics of Aminu Kano Teaching Hospital. The specimen was collected either by self or assisted masturbation into sterile bottle. The subjects were tutored on how to collect the specimens and submit to the laboratory within one hour of production. They were told to first pass urine and then wash their hands and penis with soap, then rinse with water prior to masturbation and ejaculation into sterile container. The semen was collected after the patient had abstained from coitus for at least 3 days.

The semen was then cultured on blood and chocolate agar media and incubated for 24 hours at 37°C. The infective organisms were identified by Gram Stain,

coagulase and biochemical reactions and sensitivity to various antibiotic determined. The analysis was done using a standard Neubauer counting chamber and the 5th generation SQAll C-P sperm quality analyzer by medical electronic system, Ltd England. Where the improved Neubauer counting chamber was used, the semen was diluted 1 in 20 with 1% formalin and the spermatozoa counted under the microscope using x40 objective. Appropriate quality control measure was observed as recommended by World Health Organization, (1999). SQAll C-P quality analyzer has to pass self test before analyses was done. The sperm density, volume, viscosity (liquefaction), the percentage of actively motile sperms, the percentage of abnormal forms, the presence or absence of pus cells were evaluated. The semen was analyzed on two different occasions at eight weeks interval for those semen specimens which gave abnormal results. The average of the two readings was calculated. Analysis was carried out immediately they were received. Seminal fluid fructose reaction was carried out on all azospermic specimens using a mixture of resorcinol/HCl reagent.

Results:

The results are as summarized in Tables 1,2,3 and 4. Table 1 shows that 291 (58.2%) of the subjects had abnormal seminal fluid sperm density, motility and morphology, while 209 (41.8%) of the subjects had seminal fluid cell density above twenty million per millilitre, motility and morphology above 60% respectively. Whereas oligospermic subject had sperm morphology of 46.3%, motility 44.18% and density of 8.8×10^6 cell/ml, severe oligospermic subjects had sperm morphology of 35.4%, motility of 24.0% and density of 0.63×10^6 cell/ml. Of the two hundred and nine patients whose sperm count was more than twenty million per millilitre, seminal fluid infection was detected in thirty one (14.8%). Seminal fluid infection was detected in fifty-one (35.2%) of oligospermic patients. Similarly infection was detected in twenty six (44.1%) of severe oligospermic subject and sixty five (74.7%) in azospermic patients (table 2). Table 3 indicates *Staphylococcus aureus* was detected in one hundred and eighteen (68.2%) infected seminal fluids, *Escherichia coli* was detected in thirty one (17.9%) and *Candida species* in ten (5.78%). Other pathogenic organisms detected were mixed growth of *Escherichia coli* and *Staphylococcus aureus* in eight (4.62%) and *Streptococcus species* in six (3.49%) seminal fluids. Seminal fluid fructose was negative in only one seminal fluid out of the eighty seven azospermic seminal fluids (Table 4).

Table 1: Seminal Fluid Analysis (Mean ± SEM)

Sperm	Percent(%)	Age (Mean)	Volume (ml)	Morphology (%)	Motility (%)	Density (X10 ⁶ cell/ml)
Normospermia (>20x10 ⁶ cell/ml) n = 209	41.8	38.6±1.02	2.68.2±0.09	68.2±1.26	76.1±1.38	52.69±2.66
Oligospermia (2-19x10 ⁶ cell/ml) n= 145	27.6	39.6±1.35	2.39±0.16	46.3±1.43 P<0.001	44.18±1.9 P<0.001	8.80±0.46 P<0.001
Severe Oligospermia (<2x10 ⁶ cell/ml) n= 59	13.2	36.2±1.18	2.63±0.15	35.4±2.45 p<0.001	24.0±2.24 P<0.001	0.63±0.06 P<0.001
Azoospermia (no sperm cells) n=87	17.4	38.8±2.46	2.39±0.16	-	-	-

Table 2: Seminal Fluid Infection and Density

Sperm density (x 10 ⁶ cell/ml)	Number of patients	Number infected	Percentage
> 20	209	31	14.8
2 – 19	145	51	35.2
< 2.0	59	26	44.1
Nil	87	65	74.7

Table 3: Pathogenic Organisms Isolated From Seminal Fluid

Organisms	Number	Percentage
<i>Staphylococcus aureus</i>	118	68.2
<i>Escherichia coli</i>	31	17.9
Candida species	10	5.78
Mixed growth of <i>Staphylococcus aureus</i> and <i>Escherichia coli</i>	8	4.62
<i>Streptococcus</i> species	6	3.49
Total	173	100

Table 4: Seminal Fluid Fructose Reaction in Azoospermic Patients

Result of reaction	Number	Percentage
Orange to red colour (positive)	86	98.9
Colourless reaction (negative)	1	1.1
Total	87	100

Discussion

The prevalence of male factor infertility in Kano was observed to be 40.8%. This is consistent with that of Onwudiegwu and Bako⁶, who observed a 46% prevalence in Ife, but lower than 55-93% observed in Enugu, eastern Nigeria by Chukwudebelu⁸. Seminal fluid analysis is a generally accepted method of assessing male fertility potential. Macleod and Gold⁹ suggested that men with sperm counts above 20 million/ml or total count above 100 million per ejaculate should be considered fertile. Other investigators have revealed that sperm counts above 10 million or 25 million per ejaculate should be considered normal provided other parameters such as motility and morphology are normal¹⁰⁻¹¹. The concept of a minimal sperm count adequate for fertility has generated a lot of arguments since it was introduced in the 1920s. It has been demonstrated that pregnancies was achieved by normal males who had spermatogenesis suppressed to about one million per millilitre as part of male contraceptive study¹²⁻¹³.

Seminal fluid infection contributed in no small measure to reduced sperm density, asthenospermia and teratospermia (abnormal sperm morphology of greater than 50%) in this study. Interestingly, *Staphylococcus aureus* as causative organism accounted for 68.2% of seminal fluid infection in this study. Again this is consistent with that reported by Okon *et al.*⁷ in Maiduguri, where *Staphylococcus aureus* was isolated from 62.5% of the seminal fluids. Most practitioners dismiss this infection as mere contamination which is assumed to be of no significance. The WHO definition of seminal tract infection does not clearly differentiate between infection, contamination and colonization of the genital tract. Semen that passes through the genital tract is routinely contaminated with Gram positive cocci such as *Staphylococcus*, *Streptococcus* and *Diphtheroids*¹⁴. It is generally accepted that *Staphylococcus aureus* which are coagulase positive is regarded as pathogenic and should be treated. The presence of this microorganism can no longer be ignored. The longer the infection persist, the greater the damage and loss of germ cells. The rate (percent) of infection increases from normospermic to azospermic males (table 3). According to Bukharin *et al.*¹⁵ opportunistic microorganisms cause classical infections of the urogenital tract and subclinical reproductive tract infections. These infections of the seminal fluid lead to decrease in the number of spermatozoa, the suppression of their motility, changes in their morphology and fertilizing capacity. Our result shows that 58.2% of the males had sperm density below 20 million/ml. The sperm morphology deteriorated progressively in oligospermic to severe oligospermic males. In other words it decreased with decreasing sperm density. Asthenospermia (motility less than 50%) was also observed in 58.2% of the study population. The

motility decrease from 46.3% in oligospermic to 35.4% in severe oligospermic subjects. All semen characteristics were statistically significantly different ($P < 0.001$) when compared with normospermic subjects. Similarly severe oligospermic was compared with oligospermic males and found to be significantly different ($P < 0.001$).

Seminal fluid fructose is usually done for all azospermic cases. Fructose produced in the seminal vesicles is androgen dependent and serves as a source of energy for ejaculated sperm. Fructose is absent in individuals with congenital absence of the vas deferentia who have no seminal vesicles and those with bilateral ejaculatory duct obstruction. Fructose was absent in only one seminal fluid in our study.

It is concluded that the prevalence of abnormal sperm cells indices and bacterial infection is high. In the management of male factor infertility *Staphylococcus aureus* should be properly treated and no longer ignored.

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