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**Prevalence of bacterial infections and their effects on semen of infertile men, seen retrospectively at Mulago Hospital** **2012-2005**.

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**Abstract**

A retrospective analytical study to determine the prevalence of bacterial infections, their effects on the semen quality, and the antibiogram of the bacterial isolates, in semen of infertile men referred to Mulago Hospital Infertility clinic, Makerere University, Kampala-Uganda was done from March 2012 to Aug 2005. Clinical records of semen of infertile men attending the infertility clinic at Mulago Hospital were retrieved and analyzed. Only results of samples analyzed according to World Health Organization guidelines of (1999) were included in the study. The variables of interest were spermatozoa; concentration, motility, morphology and vitality,bacterial isolates and their antibiotic sensitivities; and effect of bacterial isolates on semen quality and quantity. Sixty-six percent (n=57) of the semen specimen cultured had bacterial growth. The most prevalent bacteria isolates were *Coagulase Negative Staphylococcus* (40.35%), *Staphylococcus* *aureus* (31.57%), and *Enterococcus* *feacalis* (19.29%. Others were *Streptococcus* *agalaceae* (1.75%), *Pseudomonas* *earuginosa* (1.75%), *Esch*.*coli* (1.75%), *Ureaplasma* *urealyticum* (1.75%) and *Acitenobacter* *baumani* (1.75%).The semen abnomalities were Azoospermia (12.79%), Normozoospermia (11.62%), Asthenoteratozoospermia (24.4%) and Oligoasthenoteratozoospermia (51.16%). *Staph* *aureus was*  exhibiting 33.5% asthenoteratozoospermia, 33% oligoasthenoteratozospemia and 22 % Normozoospermia, whereas *CNStaphylococcus* and *Enterococcus feacalis* exhibited 82% and 73% oligoasthenoteratozoospermia respectively. The rest of bacterial infection exhibited astheno-teratozoospermia. The bacteria were mostly sensitive gentamycin (90%) and augumentin (75%), as they were resistant to Amoxyllin (100%) and cotrimaxazole at (100%).In conclusion it was found that bacterial infection in semen was quite common in Uganda, leading to deterioration of semen quality resulting in likely male infertility. Therefore bacteria culture and sensitivity should routinely be done in semen analysis.

***Key words:*** *spermatozoa, semen quality, bacterial infection.*

**Introduction**

Infertility, the involuntary incapacity to reproduce an offspring is estimated to affect 8-10 million couples in sub-Saharan Africa where it is rated variously at 20-30% depending on sex. In females, it is the inability to conceive, carry conceptus to term and deliver at birth whereas in males, it is the inability of semen from potent men to fertilize the ova or failure to produce sperms, or failure to mate despite presence of normal semen (1). A couple is generally regarded as infertile when unprotected intercourse does not result into pregnancy within two years of sexual relationship. World**-**wide, infertility problem affects 50-80 million couples (2). Bacterial infection is one of the commonest causes of male infertility. They infect the genital tract, contaminate the semen, interfere with the sperm movements, infect the sperms to reduce their longevity and later may indirectly affect spermatogenesis and sperm delivery (3).

 In Uganda, infertility is a common social concern especially in rural areas where causal awareness of even treatable forms of infertility is minimal. Infertility investigations do not routinely include the role of infections in semen. The majority of infertility investigations in Uganda evaluate the male partner on the basis of semen quality without bacterial culture and sensitivity. Therefore the spectrum and range of bacterial infections contributing to male infertility was not known. The few infertile clients who visited hospitals received symptomatic treatment which was haphazardous because of un established diagnosis. Unearthing this dire situation, a study done in 1990 (4)described the infertility of sexual transmitted diseases in Uganda as a dilemma requiring more research and investment. The aim of this study was to establish the prevalence of bacterial infections in semen of infertile men referred to Mulago Hospital and to evaluate the effect of the bacteria isolates on the semen quality and to determine the antibiotic sensitivities of the isolates in order to recommend prevention, therapy and management.

**Materials and methods**

Records of semen of 86 men with a history of infertility and consulting at Mulago Hospital, Gynaecology Outpatient infertility clinic from March 2012 to Aug 2005 were retrieved and analyzed. Their age range was from 26-47 years with a mean± SD of 33.4±5.06. Only results of semen samples analyzed according to WHO guidelines of (5 ) were included in the study. Semen samples were collected in a room provided near the laboratory by masturbation. The samples were cultured using blood agar, MacConkey Agar and Chocolate Agar and incubated at 370C with 5%CO2 for 24 hrs. The bacterial isolates were identified using their morphological appearance, Gram staining and their biochemical characteristics. The isolates were subjected to antibiotic sensitivity testing by disc diffusion method (6). The prevalence of bacteria isolates, effects of bacteria on semen quality and quantity; using variables of spermatozoa: morphology, motility, concentration and vitality and the antibiotic susceptibilities of the isolates were statistically analyzed and evaluated.

Mulago Hospital is a National, Referral, Teaching and Research Government hospital. It handles mostly tertiary health care. Most of infertility patients who attended the clinic were referred. The study was first approved by the Department of Obstretics and Gynaecology.

**Results**

Records of semen analyses of eighty six(86) men with a history of infertility that had come for consultation at the infertility clinic in Mulago Hospital; 57/86(66%) had bacterial growth. Details of the bacteria culture were as shown in Table 1. The semen samples were found to be of varying characteristics of abnormalities ranging from azoospermia (12.8%), normozoospermia (11.16%), and asthenoteratozoospermia (24.4%) to oligoasthenoteratozoospermia (51.16%).At least 85 % of the semen samples analyzed had at least one abnormality. The sensitivity of different bacterial isolates to different antibiotics were shown as in Table 2. Associated abnormal effects of different bacterial isolates on semen were as shown in Table 3. The physical characteristics of abnormal semen collected was as shown in Table 4. The records of the semen analyses showed the abnormalities shown in Table 4. Appearance- 16%, liquefaction-47%, viscosity-51%, Ph79% and Volume at 22% were all abnormal***.*** The micro-characteristics of the 75 semen samples had the following  *abnormalities:* motility 62%, morphology 79%, concentration 60% and vitality at 49% abnormality. However leuckospermia looked to be a poor indicator of bacterial infection as only 30% (26/86) of the samples were abnormal i.e. >0.5×106/ml

Table 1. Types of bacterial isolates

|  |  |  |
| --- | --- | --- |
| Isolate | Number | Percentage |
| *CN Staphylococcus* | 23 | 40.35 |
| *Staphylococcus* | 18 | 31.57 |
| *Entero.feacalis* | 11 | 19.29 |
| *Strep.agalacie* | 1 | 1.75 |
| *Pseudomonas eruginosa* | 1 | 1.75 |
| *Acitenobacter baumani* | 1 | 1.75 |
| *Ureaaplasma urealyticum* | 1 | 1.75 |
| *Esch.coli* | 1 | 1.75 |

Table 2. The sensitivities of the isolates to locally common antibiotics

|  |  |
| --- | --- |
| Isolate |  % Antibiotic sensitivity  |
| AUG | CN | TE | CAZ | CXM | AML | CIP | E | SXT |
| *Entero.feacalis* | 75 | 90 | 80 | 75 | 95 | 0 | 50 | 20 | 0 |
| *S aureus* | 80 | 85 | 75 | 33 | 67 | 0 | 50 | 50 | 20 |
| *CN Staph* | 67 | 83 | 67 | 30 | 67 | 0 | 56 | 80 | 0 |
| *Pseudomonas* | 0 | 90 | 90 | 90 | 0 | 0 | 80 | - | 0 |
| *Acitenobacter baumani* | 50 | 90 | 70 | - | 70 | 0 | 0 | - | 0 |
| *Esch.coli*  | 75 | 80 | 0 | 50 | 40 | 40 | - | 0 | - |
| *Ureaplasma* | 90 | 70 | 70 | 70 | - | 0 | 50 | - | 40 |

Key: AML-Amoxyllin AUG-Augumentin CAZ-Cefutazidine CN-Gentamycin CXM-Cefuroxime CIP-Ciprofloxacin E- Erythromycin TE-Tetracycline SXT-Cotrimaxazole

Table 3. The effects of the isolates on semen parameters in percentages.

|  |  |
| --- | --- |
| Isolates | Effects / condition (%) |
|  | Azoospermia | Normozoospermia | Asthenozoospermia | Oligoasthenoteratozoospermia |
| *Staphloccus.aureus* |  3.5 |  7.0 |  10.5 |  10.5 |
| *CN Staphloccus aureus* |  - |  1.75 |  5.26 |  33.3 |
| *Entero.feacalis* |  - |  - |  5.26 |  14.0 |
| *Pseudomonas eruginosa* |  - |  - |  1.75 |  - |
| *Acitenobacter baumani* |  - |  - |  1.75 |  - |
| *Esch.coli* |  - |  - |  1.75 |  - |
| *Strep.agalacie* |  - |  - |  1.75 |  - |
| *Ureaaplasma urealyticum* |  - |  - |  1.75 |  - |

Table 4. The characteristics parameters of the semen samples of the infertile men

|  |  |  |
| --- | --- | --- |
| Parameter | Abnormal (%) | Mean ±sd |
| Appearance | 19.6 |  |
| Liquefaction | 55 |  |
| Viscosity | 59 |  |
| pH | 92 | 8.9 ±0.38 |
| Volume | 26 |  |
| Motility | 83 | 16.4 ±16.35 |
| Morphology | 79 | 5.61±6.2 |
| Concentration | 60 | 29.32 ±6.06 |
| Vitality | 49 |  |

**Discussion**

The analysis of human semen is a cornerstone in male infertility investigations. However in developing countries, this analysis is not done routinely and when it is done, no bacterial culture and their drug sensitivity is done. Infection of the male genital tract is considered as an important cause of male infertility. It is known that it may affect seminal quality and quantity through a direct action on spermatozoa or their environment by causing local inflammatory reaction or altering composition of seminal plasma. Research findings in this work show that bacterial infection infertility in men was high in Uganda with a bacterial growth with a prevalence of 66%. the most frequent bacteria isolates were *Coagulase Negative* *Staphylococcus* being the most frequent followed by *Staphylococcus aureus* and, *Enterococcus feacalis*  (see Table 1). The other minor isolates in prevalence were *Streptococcus agalacea, Pseudomonous eruginosa*, *Esch.coli* (1.75%) *Ureaplasma urealyticum (*1.75%) *and Acitenobacter baumani*. The bacteria isolates were mostly sensitive to gentamycin at 90%, augumentin at 75% and cefutazidine at 70%, but were resistant to amoxyllin (100%) and cotrimaxazole (100%)(Table 2). This finding calls for a need to have a routine semen bacteria culture to be done when investigating causes of male infertility in Uganda.

 All the bacterial isolates were associated with one or more of the conditions of asthenozoospermia, oligozoospermia and teratozoospermia (Table 3). *C.N.Staph* and *Enterococcus feacalis* showed the most sever effect of oligoasthenoteratozoospermia.

The sensitivities of the bacteria isolates to antibiotics showed that they were resistant to to common antibiotics (amoxyllin and cotrimaxazole). This could be attributed to the fact that these drugs were being abused as they are sold in any drug shops often without prescriptions and at times by non medical personnel. Drug doses are bought according to what one can afford. Therefore there is a need to enforce a drug policy restricting antibiotics use.

There were gross abnormalities in liquefaction and viscosity at 55% and at 59% respectively (Table 4). These were more pronounced in samples which had bacterial growth. The distribution between delayed liquefaction and residual increased viscosity has been stressed by many authors (7,8). They observed that prostate inflammation may alter the physiology of the gland and decrease the production and/release of the enzymes responsible for liquefaction of the semen. Spermatozoa in such abnormal viscous samples show uneven distribution and some degree of entrapment.

The pH of the semen samples was abnormal at 92% with a mean of 8.9± 0.38 (Table 4). This is in contrast with the normal pH range of 7.2-8 (6).This finding was in agreement with earlier work done that showed that bacteria contaminated semen by producing ammonia which increase the pH. Also semen from individuals with inflammation of the epididymis have been shown to have a higher pH (9)

Of the 75 semen samples, 83% exhibited abnormal sperm motility. The mean was 16.4± 16.35 Impairment of motility is a frequent cause of infertility, as the ability of the spermatozoa to swim progressively forward in reproductive tract is essential for them to reach sites for capacitation (9). This abnormal spermatozoa motility as seen in this study may have contributed significantly to infertility of these men.

 Seventy-nine percent (79%) of the samples exhibited abnormal spermatozoa morphology (teratology). This was more so in samples that had bacterial growth. According to WHO (5),any deformity on any part of a sperm is enough to render it abnormal hence incapable to participate in normal fertilization. Many studies have been done where organisms like *Esch.coli, Staphylococcus, and Enterococcus* have been shown to cause numerous alterations in morphology of spermatozoa especially at the acrosome, mid piece, neck and tail regions of the spermatozoa (10,11,12,13). It has also been shown that these organisms and or their toxins could impair sperm morphology and function (10,11,12.13). Seventy nine percent (79%) of the semen samples with abnormal sperm morphology may have been caused by the specific bacteria isolates.

The concentrations of the 86 samples (Table 4), 12.8% were azoospermic, 11.6% were normal and 76% were abnormal with varying conditions from mild to severe oligozoospermia. The mean and SD concentration of spermatozoa was 29.32±5.06 million . Studies have shown that unfavorable alterations of spermatogenesis, sperm function and transport, and the biochemical make up of seminal fluid may result from infection of the reproductive glands (14).It has also shown that *Staphylococcus* *spp* and other gram negative enteric bacterial infection of the male reproductive tract, may result in testicular atrophy, obstruction of the epididymis or vas deferens and there may also be functional disturbances of the reproductive organs and sperms due to infection which hinder the spermatozoa fertility potential (14) . The abnormal concentration of 76 % spermatozoa seen in these samples may have been due to the bacteria isolates and might have contributed to the infertility factor of these men.

 Forty-nine percent (39/75) of the samples had abnormal vitality. Vitality is an important component of sperm function because only living spermatozoa can fertilize the ovum. Studies have shown that pathological bacteria e.g. *Esch.coli* in the male genital tract was associated with decreased motility and low vitality ratio (11). In this study, semen that grew these organisms;*Enterococcus* *feacalis*, *Acitenobacter*, *C.N.Staphylococcus*, *Ureaplasma urealyticum* and to a lesser extend *Staph* *aureus* exihibted low vitality ratio.

For fertilization to occur, a single spermatozoon is necessary, nevertheless males must produce many millions of spermatozoa which are alive, normal and motile to ensure successful fertilization at the time of intercourse (5,10).This gross abnormalities of the spermatozoa in this study might have been caused by these bacterial isolates.

Similar studies done elsewhere; like in Mexico showed a bacterial prevalence 66%, and the most predominant organism was *Staphylococcus* *epidermidis(CNStaphylococcus)* followed by *Streptococcus* *viridians* (15), in Buenos Aires, it showed a bacterial prevalence of 46% in two large populations of infertile men, and the most frequent organism was *Enterococuss* *feacalis* followed by *Ureaplasma* *urealyticum* (16) and that done in Tehran showed a bacterial prevalence of 34.4% (17).This shows that bacterial infection plays a big role as a contributing factor in male infertility.

In many societies, especially in Africa, children are pillars of family life and childless marriages due to infertility tend to be unhappy and less stable than other marriages. When pregnancy does not occur, it causes many problems at personal, conjugal, family and community levels. Infertile couples describe their life without children as meaningless, miserable, shameful and unhappy, with feelings of guilt and loss of self esteem. Childless men and women would suffer social insecurity due to lack of support from children in their old age. Many of them worry because they would not have children to bury them when they die (18).

Barrenness in men is a recent phenomenon (1). Infertility has all along been associated with women; hence barren women have been a sorry figure for pity or scorn throughout the ages because of infertility misfortune. Childlessness strongly influences sexual and marital life. Women are generally blamed when conception does not occur and many childless women suffer from physical and mental abuse and disrespect. Therefore women are forced to squander their meager resources on fruitless consultations with gynecologists or traditional health practitioners. It is only after the affected female has been divorced, has successfully conceived after remarriage, while men come to realize that they have infertility problem after several childless marriages or with various partners (18). Although either of the couple engaged in sexual intercourse could be infertile, the contribution of men to the infertile problem has often been ignored at least in Uganda ,thus pushing most of the blame to the women partners.

The age group of 25-34 years in this study has been found in many investigations to be the most susceptible and therefore comprising, the highest proportion of infertile males (19,20). In most African cultures, this age group is the period that young people try to get married, or have got married and are anxious to get children. It also coincides with the time some have completed studies and have got jobs. Coincident with the age group is the period of the highest sexual activity which is likely to expose young people to multiple sexual partners, hence increasing exposure to Sexual Transmitted Diseases prematurely. Infertility status of these people may have been due infections acquired in these years, which may subsequently have caused a reduction in their fertility potential.

**Conclusion**

The prevalence of 66% bacterial infection in semen of infertile men obtained in this study indicate that the bacteria causing genital tract infection could have interfered with the semen quality and quantity, hence contributing to couple’s infertility.

**Recommendations**

Semen culture and sensitivity should be routinely instituted in all cases of male infertility investigations. This is the only precise way to identify and treat the infectious causes of infertility.

Public health programs should be instituted to sensitize people about the dangers of Sexually Transmitted Infections in men and women since most of the infectious infertility originates from them.

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