

Male Infertility: Epidemiological, Etiological, and Therapeutic Aspects at the Pr Bocar Sidy Sall University Hospital Center in Kati (Mali)

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Abstract

Introduction: Infertility is defined as the inability to conceive after at least 12 months of normal, regular, complete, and unprotected sexual intercourse. It affects approximately 180 million people worldwide (WHO). **Objective:** The aim of this study was to investigate the epidemiological, etiological, and therapeutic aspects of male infertility at the Pr Bocar Sidy Sall University Hospital in Kati. **Methodology:** This was a retro-prospective cross-sectional study covering a period of 12 months (from January 1, 2023, to December 31, 2023). The study was conducted in the Urology Department of the Pr Bocar Sidy SALL University Hospital in Kati. It focused on men who consulted for fertility issues during the study period. **Results:** The most represented age group was 30 - 39 years old (54%), and military personnel were the most represented (41%). Sixty-seven percent of our patients had primary infertility, compared to 33% with secondary infertility. The main history of urogenital infection was urethritis/orchiepididymitis with 46%, followed by urinary bilharzia with 37%. Varicocele was the main cause of infertility and the sperm profile was that of oligoasthenoteratozoospermia. Varicocele surgery was performed in 87% of cases. **Conclusion:** Male infertility is a public health problem in Mali, and varicocele remains the most common risk factor.

Keywords

Infertility, Varicocele, Male, Spermogram, Oligospermia, Azoospermia, Kati

1. Introduction

Infertility is a major health problem worldwide. According to the World Health Organization (WHO), it is defined as a condition of the male or female reproductive system characterized by the inability to achieve pregnancy after 12 months or more of regular, unprotected sexual intercourse [1].

Infertility is primary if there has never been a recognized pregnancy (the man has never had a child) and secondary if there has already been fertilization, regardless of the outcome and duration of the pregnancy [1].

Male infertility, on the other hand, refers to the inability of a man of reproductive age to cause pregnancy in a fertile woman [2].

Infertility affects millions of people of reproductive age worldwide and has an impact on their families and communities. It is estimated that between 48 million couples and 186 million people are affected by infertility worldwide [1].

The rate of infertility varies from country to country. In Africa, infertility affects 25% to 40% of the sub-Saharan population [3].

One study showed that male infertility varies from 30 to 50% in Mali [4].

A study conducted in Senegal in 2006 found that there were twice as many cases of primary infertility (68.4%) as secondary infertility (31.6%). Male responsibility (31.7%) was twice as high as female responsibility (14.7%) [5].

Male infertility is a public health problem in Mali, and it is estimated that 15 to 17% of couples are affected [6].

Several studies have focused on male infertility in Mali, but we do not have data on long-term follow-up. It is in this context that this study was undertaken with the aim of improving patient follow-up and care.

2. Materials and Methods

This was a descriptive cross-sectional study with retrospective and prospective data collection on men who consulted or were referred for fertility treatment. It was conducted over a 12-month period from January 1, 2023, to December 31, 2023.

We included in our study all men who consulted or were referred to our department for fertility issues during the study period and whose files were complete.

We did not include patients who did not wish to participate in the study, patients whose medical records were incomplete, or patients who consulted outside the study period.

Male infertility in our study was defined by the combination of:

- The couple's inability to conceive after at least 12 months of normal, regular, complete, and unprotected sexual intercourse.

The absence of major factors contributing to female infertility, as determined during a gynecological examination, and based on the results of at least two semen analyses, the most recent of which must have been performed at least three months ago.

We requested additional tests.

Doppler ultrasound of the testicles to check for varicocele and measure testicle size using Lambert's formula ($V = L \times L \times H \times 0.71$); the normal volume used for our study was 20 ± 3 ml. sperm analysis, spermocytogram, sperm culture, and hormone assessment including serum testosterone, FSH, and LH levels standard preoperative assessment (complete blood count, blood sugar, creatinine, Rh factor, urea, PT-APTT) including other biological assessments.

Varicoceles were clinically graded according to the Dubin classification [7].

- Grade 3 when the varicocele is visible on inspection of the scrotum in the standing position;
- Grade 2 when it is not visible on inspection but easily palpable in the standing position without the Valsalva maneuver;
- Grade 1 when it is only palpable with the Valsalva maneuver;
- Grade 0 when it is not palpable (subclinical diagnosis).

The evaluation of treatment results, carried out after a minimum of three months, was based on the spermogram, comparing pre- and post-treatment sperm parameters.

Infectious testing was requested when clinical signs were suggestive.

A spermogram was prescribed for all patients after a period of abstinence of 3 to 7 days. The first samples were collected in the laboratory and rechecked 30 days later to confirm the sperm abnormality.

We used the 2010 WHO standards for sperm analysis and the modified David classification (**Table 1**) [8].

Table 1. 2010 WHO standards for sperm analysis and the modified David classification.

Spermatic parameters	Threshold values
Period of abstinence	3 - 5 days
Ejaculate volume	1.5 ml
Sperm concentration	15 million/ml
Count per ejaculate	39 million per ejaculate
Progressive sperm motility	32%
Total sperm motility	40%
Vitality	58%
Percentage of normal forms Strict criteria	4%
Modified David classification	23%
Leukocyte concentration	1 million

The hormone test, spermogram, spermocytogram, and sperm culture + antibiogram were performed in the same laboratory for standardization purposes:

LH: 1.1 - 25 mU/ml, FSH: 1.5 - 11.8 mU/ml, Total testosterone: 2.2 - 10.5 ng/ml;

Prolactin: 54 - 340 μ UI/ml.

Our data was collected from a pre-established individual survey form containing the variables and contact details for our study. We entered and analyzed the data using Word 2019, Excel 2019, and SPSS Statistics 26 software.

3. Results

We collected data from 1647 patients who came for consultation, including 1342 men, 46 of whom consulted because they wanted to have children, representing 3.42% of all male patients.

The average age of the patients was 38, with extremes of 23 and 48. The most represented age group was 30 - 39, accounting for 54%.

Primary infertility was the most common type, accounting for 67%.

Military personnel were the most represented group, with a prevalence of 41%.

The majority of our patients were monogamous (93%), followed by polygamous (7%).

In our study, the majority (52%) of patients consulted between 2 and 5 years of being in a relationship, while the remaining 48% consulted after 5 years.

A history of urogenital infection (orchiepididymitis) was found in 21 patients, or 46% of cases, followed by urogenital bilharzia in 17 patients, or 37% of cases.

On urogenital examination, bilateral varicocele (grade 2) was found in 72% of patients, followed by left varicocele (grade 2) in 15%.

Bilateral testicular hypotrophy was found in 61% of patients on Doppler ultrasound of the testicles.

Oligoasthenoteratozoospermia was found in 43% of cases in infertile patients (**Table 2**).

Table 2. Distribution of patients according to the conclusion of preoperative cyto-spermiological abnormalities.

Cyto-spermiological	Abnormalities number	Percentage %
Oligoasthenoteratozoospermia	20	43%
Oligoasthenoteratonecrozoospermia	4	9%
Azoospermia	11	24%
Teratozoospermia	3	7%
Oligospermia	7	15%
Normal	1	2%
Total	46	100

In our study, hyperprolactinemia was the most common hormonal disorder, accounting for 41% of cases.

The majority of our patients underwent open surgery, accounting for 89% of cases.

For patients with varicocele, the MARMAR technique, with a subinguinal approach, was used in all patients, accounting for 100% of cases. The drugs used in most cases were bromocriptine and testosterone enanthate, depending on the cause.

In our study, we noted a normalization of the spermogram in 6 patients, or 15%, after surgery during an average follow-up period of 3 to 6 months.

At the end of our study, among the 6 patients with normal sperm, 5 were fortunate enough to have a child, *i.e.*, 11%.

4. Discussion

The average age of the patients was 38 years, with extremes of 23 and 48 years. These results differ from those of Kalantan M [9] and Kbirou A *et al.* [10], who found average ages of 33.1 years with extremes of 18 - 47 years and 37.5 years with extremes of 25 and 50 years in their study, respectively. The young age in our study can be explained by the age of marriage for men in our country. As a general rule, people marry early in our country.

In our study, primary infertility was found in 31 patients, or 67% of cases. This rate is lower than that of M Kalantan *et al.*, who found infertility in 11 patients, or 84.61% of their study. Traoré M *et al.* also found primary infertility in 70.4% of their study [9]. These frequencies can be explained by the concern of married couples to have a child as soon as possible, especially in Mali, where there is family pressure.

All socio-professional groups were represented, but military personnel were in the majority, accounting for 41% of cases, followed by farmers in 11% of cases. This result differs from that found by Kadima Lufuluabo C *et al.* [11], with 54.5% of cases involving motorcycle taxi drivers. This high rate among military personnel can be explained by their exposure to heat, wearing tight clothing, standing for long periods of time, and military maneuvers. All these factors create abdominal pressure, leading to a risk of varicocele.

Ninety-three percent of our patients were monogamous and 7% were polygamous. Our results are comparable to those of Traoré M *et al.* in Mali, who found 57% to be monogamous and 34% to be polygamous [4]. This low rate of polygamy can be explained by a change in mentality, as infertile men sought a solution in a second marriage rather than questioning themselves.

In our study, the majority of patients, *i.e.*, 52% of cases, consulted between 2 and 5 years of living together, while the remaining 48% consulted after 5 years. Halidou. M *et al.* [12] found that the average duration of infertility was 4 years, with extremes of 16 months and 22 years. These rates illustrate that young couples consult as soon as possible and also that men are aware of their share of responsibility for the couple's infertility.

A history of urogenital infection (orchiepididymitis) was found in 21 patients, or 46% of cases, followed by urogenital bilharzia in 17 patients, or 37% of cases.

Our results are comparable to those of KADIMA L C *et al.*, who found 53.2% of

urogenital infections [11]. This high rate can be explained by the fact that most young people like to bathe in river or backwater during the hot season.

In our study, varicocele was the most common etiology, accounting for 87% of cases. In the literature, varicocele is found in 15% to 20% of the general male population, 35% of men with primary infertility, and more than 70% with secondary infertility [13] [14].

Bilateral testicular hypotrophy was found in 8 patients (17%), and this hypotrophy was more pronounced on the left than on the right. This rate is lower than that reported by Kalantan M *et al.*, who found testicular hypotrophy (testicular volume less than 10 mL) in 5 patients (22.7% of cases) [9]. According to the literature, there is a correlation between the severity of varicocele and the occurrence of testicular hypotrophy: up to 20% of grade 3 cases are accompanied by testicular atrophy [15].

Varicocele was discovered in 80.7% of cases during a consultation for marital infertility at the University Hospital of Guinea by AB Diallo *et al.* [16].

The preoperative spermogram revealed oligoasthenoteratozoospermia in 40% of cases in our study. This result corroborates the data in the literature, according to which the sperm profile of a patient with varicocele most often corresponds to oligoasthenoteratozoospermia [9] [17] [18].

In our study, we found that hyperprolactinemia was the most common hormonal disorder, accounting for 41% of cases. This rate differs from that reported by Kadima C *et al.*, who found elevated FSH in 70% of cases and hyperprolactinemia in 9% [11].

In our study, we performed surgery on 41 patients (89%): varicocele (87%) and testicular ectopia (2%). Varicocele repair was performed in 40 patients (87%). The Marmar surgical technique was the most widely used in our study, with 27% of short-term postoperative complications (wall infection and reactive hydrocele). It was used because of its lower incidence of recurrence compared to the high retroperitoneal approach [19]. It also allows surgery under local anesthesia. It should be noted that the treatment of varicocele has seen great progress over the last decade, from simple cure to other techniques: surgical, radiological, and currently laparoscopic [20].

Three months after surgical treatment, we noted a normalization of sperm parameters in 6 patients (15%), 2 stationary (5%) and 33 lost to follow-up (80%). It should also be noted that among the 6 patients with normal sperm, 5 were fortunate enough to have a child (11%).

However, the results obtained are consistent with numerous studies and meta-analyses published in the literature [9] [17] [21]. In Guinea, A.B. Diallo *et al.* noted a significant improvement in sperm quality in 67 patients, with normalization of the spermogram in 33 of them out of a total of 113 patients after an average follow-up of 17 months in Conakry, Guinea [16]. Kalatan *et al.* found an improvement in motility of more than 37.8% and a pregnancy rate of 38.5% in their study [9]. Asafu-Adjei and colleagues found a 17.7% improvement in mobility after varico-

cele treatment [21]. Overall, the literature agrees on an improvement in sperm parameters and pregnancy rates after varicocele surgery.

The limitations of our study were the small sample size, the retrospective nature of some of the data, and the difficulty of performing karyotyping to investigate genetic causes in our country (Mali).

5. Conclusions

Male infertility is a public health problem in our context in Mali, and it is difficult to identify all the risk factors for this anomaly. However, varicocele remains the most common risk factor. Men are becoming increasingly aware of the role of men in couple infertility, which leads them to seek consultation and treatment. Sperm analysis remains the gold standard for assessing male infertility.

Treatment of varicocele and other risk factors significantly improves patients' sperm parameters.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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