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Clinical and Paraclinical Profile of Male Infertility in Two Hospitals in Low - Income Setting, Cameroon

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Abstract: *Background*: Male infertility has diverse aetiologies and contribute to more than 50% of infertility, but workup required for the diagnosis are not always available in low-income settings. *Methods*: We aimed to describe clinical and paraclinical profile of male infertility in low- and middle-income setting. This was a retrospective cross-sectional study in two urology referral hospitals, including consenting male partners of infertile couples. Sociodemographic, clinical and paraclinical (including semen analysis, ultrasound results and hormonal level) data were collected from patient's records and interview. Qualitative and quantitative variables were described with corresponding statistics. *Results*: Overall 137 participants were included in this study with a mean age of 35.4±7.3 years. Erectile dysfunction (35%), and testicular pain (27.7%) were the most common symptoms. The most frequent abnormalities were asthenospermia, oligospermia, azoospermia and necrospermia found in 69.3%, 59.9%, 21.2% and 19.7% of subjects respectively. Normal value of testosterone, luteinizing hormone, Follicle Stimulating Hormone and prolactin values were found in more than half of participants on ultrasound analysis, varicocele was present in 58.9% of subjects and testicular hypotrophy in 45.8%. *Conclusion*: Seminal and ultrasound abnormalities are common in male with infertility in our context. Sexual Transmitting Infection and varicocele seems to be predominant aetiologies. Further research should be carried out to investigate on the different aetiologies of fertility in men for better management.

Keywords: Male Infertility, Paraclinical Profile, Cameroon

1. Introduction

Infertility is a reproductive disorder of a couple characterise by the inability to achieve a clinical pregnancy after 12 months of regular unprotected sexual intercourse, in the absence of contraception [1]. It has been identified as a public health priority by the Centre for Disease Control and Prevention of the United States, with an emphasis on quality-of-life impairment, psychological distress, social stigmatization, economic strain and marital discord. Globally, infertility affect more than 1500 women per 100 000 and about 770 men per 100 000 [2]. The burden of this affection is different across the world. Low-income countries including sub-Saharan Africa have the highest prevalence of both primary and secondary infertility. Cameroon is among the

most affected countries in this region: the prevalence of primary infertility is ≥ 3%, while the prevalence of secondary infertility is ≥ 13% [3].

Aetiologies of infertility can be related to the women, to the men, to both partners or unknown. However, in most cases especially in sub-Saharan Africa, women are often blamed for the infertility even when the problem is from their husband. Male infertility remains therefore less known and explore, although it contributes to more than 50% infertility [4, 5]. This situation is worsened in low-income countries by the cost of workups required for the diagnosis of male aetiologies of infertility (reference). Indeed, the diagnosis require a semen analysis, hormonal level assessment including serum follicle-stimulating hormone (FSH), testosterone, luteinizing hormone (LH) prolactin, scrotal ultrasound, testicular biopsy, and genetic screening [6]. These tests are not always available in our setting (especially in rural area) and data on male aetiologies of infertility in African population are scarce. We aimed to describe the clinical and paraclinical profile of male infertility in a low-income setting, in order to guide diagnosis of male infertility aetiologies when lab tests and ultrasound are not available.

2. Method and Materials

2.1. Study Design and Setting

This was a retrospective cross-sectional study conducted at the Douala General Hospital (DGH) and the Douala Medical-Surgical Urology Centre (These health centres are urology referral centres in the littoral region of Cameroon and even in the country.

We consecutively included male partners of infertile couples using the signification of the World Health Organization (WHO) Revised Glossary on ART Terminology, 2009 [1]- followed in these hospitals between 1st January 2014 and 31th October 2018. Patients were recruited at outpatient unit after informed consent. Data were collected through interview and from records of patients who had performed a semen analysis. Those with no regular sexual intercourse (less than twice a week) and those who were not living with their partner during the past 12 months were excluded.

2.2. Data Collection

Sociodemographic data, past medical history and symptoms were collected through files of. Semen analysis results were obtained from the patient's record, after verifying that sample collection and analysis were conducted according to the WHO laboratory manual for examination of human semen and sperm-cervical mucus interaction [7]. These results were semen volume, spermatozoid count, mobility, vitality and shape, and semen culture results. Furthermore, hormonal levels including testosterone, Follicular Stimulating Hormone (FSH), Luteinizing Hormone (LH) and prolactin were retrieved from patient's record when the analysis was done. Similarly, when a testicular ultrasound and other infections analysis were performed, results were also collected on a pretested data collection form designed for the purpose.

2.3. Data Management and Analysis

Categorical data were described with frequency and percentage while continuous data were described with mean±standard deviation or median (interquartile range) respectively when data were normally distributed or skewed - Kolmogorov Smirnov test was used to check the normality. Semen analysis results were grouped in ranges according to the WHO reference values for human semen characteristics [8]. Local laboratory reference values were used for hormonal levels. Data collected were analysed with Statistical Package for Social Sciences version 20 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp).

2.4. Ethical Consideration

Administrative authorization was obtained from corresponding hospitals direction before the beginning of the study. Furthermore, the study was approved by the institutional ethical review board of the University of Douala (N° 1688 CEI-Udo/02/2019/T). Prior to inclusion of each participant, informed consent was requested and the study was conducted in accordance with the Ethical Principles for Medical Research Involving Human Subjects as stated in the Helsinki statement [9].

3. Results

3.1. Study Population Characteristics

Out of 417 patients' files with infertility, 137 cases with a mean age 35.4±7.3 years of were included after reviewing the selection criteria. Primary and secondary infertility were found in 65.7% (90/137) and 34.3% (47/137) of participants respectively, with a median duration of infertility of 3 (2; 5.5) years. The most common relevant past medical history were sexual transmitted infections (STI), history of mumps and cryptorchidism found respectively in 43.1% (59/137), 30.7% (42/137) and 8.0% (11/137) of patients; while the most frequent past surgical history were hernia repair in 16.1% (22/137), other non-urological surgery in 11.7% (16.137) and varicocele surgery in 10.9% (15/137).

3.2. Clinical Profile

Infertility was asymptomatic for 3.6% (5/137) of participants. Among symptomatic patients, erectile dysfunction and testicular pain were found in 35% (48/137) and 27.7% (38/137) respectively., Varicocele was present on physical examination in 19% (26/137) patients. The mean body mass index (BMI) was 26.9±4.2 Kg/m^2, with 46% of overweight (63/137) and 19.7% (27/137) of obese patients (Table 1).

Table 1. *Clinical characteristics of study population (n=137).*

Variables	Frequency (n)	Percentage (%)
No symptoms or physical sign	5	3.6
Symptoms		
Erectile dysfunction	48	35.0
Testicular pain	38	27.7
Ante portas ejaculation	8	5.8
Physical signs		
Absence of testicles in bursae	11	8.0
Urethral meatus malformation	1	0.7
Epispadias	2	1.4
scrotal swelling	2	1.4
Gynecomastia	4	2.9
Varicocele	26	19.0
Left	16	11.7
Right	8	5.8
Bilateral	2	1.5
Testicular consistency		
Firm	104	75.9
Intermediate	32	23.4
Soft	1	0.7
Other signs	7	5.1
BMI ranges (kg/m^2)		
< 18.5	1	0.7
[18.5 – 25]	46	33.6
[25 – 30]	63	46.0
[30 – 35]	22	16.1
[35 – 40]	3	2.2
≥ 40	2	1.5

BMI: Body Mass Index.

Table 2. *Description of the results of semen analysis of the study population.*

Variables	Frequency (n)	Percentage (%)
Volume		
Hypospermia	11	8.0
Normal	122	89.1
Hyperspermia	4	2.9
Count		
Azoospermia	29	21.2
Cryptozoospermia	8	5.8
Oligospermia	82	59.9
Normal	26	19.0
Vitality		
Necrospermia	27	19.7
Mobility		
Asthenospermia	95	69.3
Shape		
Teratospermia	52	38.0
Semen culture (n=46)		
Negative	24	52.2
Positive	22	47.8
Staphylococcus aureus	15	68.2
Escherichia coli	2	9.1
Enterococcus spp	2	9.1
Candida albicans	2	9.1
Other*	5	22.7

*Other germs include Corynebacterium spp, Streptococcus spp, Proteus mirabilis, Serratia marcescens, Neisseria gonorrhoea.

Table 3. *Results of hormonal and infectious analysis in the study population.*

Variables	Frequency	Percentage (%)
Testosterone. *ng/ml* (n=78)		
< 2.7	9	11.5
[2.7-10.7]	61	78.2
> 10.7	8	10.3
FSH, *mUI/ml* (n=64)		
[1-12]	42	65.6
> 12	22	34.4
LH, *mUI/ml* (n=55)		
< 2	1	1.8
[2-12]	45	81.8
> 12	9	16.4
Prolactin, *ng/ml* (n=38)		
< 2.5	1	2.6
[2.5-17]	25	65.8
> 17	12	31.6
Chlamydia serology (n=43)		
Positive	12	27.9
Negative	31	72.1
Mycoplasma serology (n=23)		
Positive	9	39.1
Negative	14	60.9

Table 4. *Results ultrasound in the study population (n=107).*

Variables	Frequency (n)	Percentage (%)
Varicocele	63	58.9
Location		
Left	17	27
Right	9	14.3
Bilateral	37	58.7
Stage		
1	18	28.6
2	32	50.8
3	11	17.5
4	2	3.2
Testicular hypotrophy	49	45.8
Location		
Left	14	28.6
Right	5	10.2
Bilateral	30	61.2
Cryptorchidy	3	2.8
Location		
Right	1	33.3
Bilateral	2	66.7
Hydrocele	20	18.7
Location		
Left	3	15.0
Right	11	55
Bilateral	6	30
Testicular or epididymal cyst	15	10.9
Calcification	5	4.7

3.3. Paraclinical Profile

Out of 137 cases, one patient (0.7%) had no abnormality of semen analysis. Table 2 shows details of semen analysis results. The most frequent abnormalities were asthenospermia, oligospermia, azoospermia and necrospermia found

respectively in 69.3%, 59.9%, 21.2% and 19.7% of subjects. Combined abnormalities were Oligoasthenospermia (52.6%), Asthenoteratospermia (36.5%), Oligoteratospermia (28.5%), Oligoasthenoteratospermia (27%). Among the 46 semen cultures performed, 47.8% (22/46) were positive with *Staphylococcus aureus* as the most frequent germ.

Normal value of testosterone, LH, FSH and prolactin values were found participants who did that analysis. Of the 137 patients included in the study, 107 (78.1%) had a testicular ultrasound. Abnormal results were: varicocele in 63 (58.9%) patients, testicular hypotrophy in 49 (45.8%) patients, hydrocele in 20 (18.7%), and cryptorchidism in 3 (2.8%) patients. Table 3 and Table 4 describe the results of hormonal and ultrasound analysis.

4. Discussion

Male infertility is a major public health concern, with psychological, economic and social impact, especially in our context. The profile and aetiologies are not well evaluated in low incomes setting, due to poor access to workups required for the evaluation. We aimed to describe results of a population of 137 male partners of infertile couples from Cameroon.

The most frequent complaint in our study was erectile dysfunction (51%) and clinical varicocele (19%) was the most represented physical sign. A similar result was reported by Uadia *et al.* with 50.7% of erectile dysfunction among male patients attending primary care clinics [10]. Indeed, there is a clear relation between sexual function and fertility, as a good erection is necessary for effective intercourse leading to pregnancy. Although erectile dysfunction is more common in elderly patients with cardiovascular comorbidities, our population was younger with a mean age of 35.4±7.3 years. This can be explained by the high burden of past history of STI, found in 43.1% of participants. Our results also support this hypothesis as microbiological analysis of semen collected shows that about 50% of samples were positive. Furthermore, the high frequency of testicular hypotrophy (45.8%) may also be related to inflammation following STI. Although the association between STI and sexual function is not well established, some author suggests a strong association between STI (especially prostatitis) and erectile dysfunction [11]. Management of erectile dysfunction when present and its aetiologies may be crucial in patients with male infertility.

Varicocele was found in 58.9% of infertile patients who performed testis ultrasound, although it was clinically decidable only in 16% of patients. This result was also found in Senegal where Niang *et al.* reported 64.6% of infertile patients with varicocele, which contribute to abnormal semen analysis [12]. The aetiology of this abnormal dilation and enlargement of the scrotal venous pampiniform plexus is unknown and the management is mainly through surgery [13]. In low income setting as Cameroon with poor access to surgery, it may be difficult to implement preventive and curative measures against varicocele. There is a need for more research to better understand its aetiologies in order to develop preventive measures which can be used in poor setting where neither surgical treatment, nor medical assisted procreation are affordable.

Semen abnormalities were mostly asthenospermia, oligospermia and azoospermia found in more than half of infertile males for each abnormality. Brahima et al. found a similar results in Burkina Faso, where azoospermia, oligospermia and oligoasthenospermia were the more common semen abnormalities in a population of infertile males [14]. These are elements of a “stress pattern” related to varicocele, characterize by low sperm count, poor motility and an increase in the percentage of abnormal sperm [13]. These abnormalities may also be related to STI as they can affect the sperm count, viability, motility and volume. However, we were not able in our study to distinguish semen abnormalities related to varicocele from those related to STI. Further studies may be required to establish the role of these possible aetiologies, as this may have a great impact on the management of infertility. Indeed, antibiotic treatment of infertile patients with genital infection significantly increase sperm concentration and improved sperm motility; but it has no effect of sperm viability within 30 days of beginning the treatment [15].

Most of the participants who performed the corresponding analysis had a normal level of testosterone, FSH, LH and prolactin. Alam *et al*. also found normal testosterone value in 61.6% of infertile male in India [16]. Hormonal abnormalities seem uncommon among aetiologies of infertility in low-income settings, may be as a result of high frequency of varicocele and STI. Requesting hormonal analysis as primary diagnosis workup for aetiology in low-income setting may not be a cost-effective approach.

Some limitations can be acknowledged in this study. First of all, we couldn’t include a control group of males with normal fertility. Clinical and paraclinical abnormalities found here may not be associated with infertility. However, the aim of this study was to give an overview of abnormalities presents in this population. Another limitation is that all the workups and ultrasounds were not performed in the same lab, but where rather obtained from patient’s records. This may affect the reliability of the results. This approach remains valid because it is also used in routine practice.

5. Conclusion

Asymptomatic infertility is rare in our study, with erectile dysfunction, testicular pain, and clinical varicocele being the most common clinical symptoms. Normal semen analysis is also rare, asthenospermia, oligospermia, azoospermia and necrospermia are more frequent abnormalities found. Varicocele and testicular hypotrophy are present in about half of male patients with infertility. In contrast, hormonal abnormalities are less common in our setting. These results shows that STI and varicocele may be frequent aetiologies of male infertility. Further research should be carried out to investigate on the different aetiologies of fertility in men for better management.

Declarations

Ethics Approval and Consent to Participate

Administrative authorization was obtained from corresponding hospitals direction before the beginning of the study. Furthermore, the study was approved by the institutional ethical review board of the University of Douala (N° 1688 CEI-Udo/02/2019/T). Prior to inclusion of each participant, informed consent was requested and the study was conducted in accordance with the Ethical Principles for Medical Research Involving Human Subjects as stated in the Helsinki statement.

Consent for Publication

Not applicable.

Availability of Data and Material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions Interpretation of Results

FGEN, KD; GSW; GLN; Draft manuscript preparation: FGEN, KD; GSW; GLN. All authors reviewed the results and approved the final version of the manuscript.

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