

Prevalence of Sperm Abnormalities and Factors Associated with Male Infertility in Douala, Cameroon

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ABSTRACT

Introduction: Sperm abnormalities are common causes of male infertility in Cameroon. The causes of these abnormalities are multifactorial. We described the prevalence of sperm abnormalities and to assess its associated risk factors among infertile participants visiting four hospitals in Douala. This multicentre descriptive study was carried out from the January 1st 2010 to the December 31st 2020 in four hospitals in Douala. The study enrolled 94 infertile participants aged between 25 to 53 years. Information from each consented participant was collected using a structure questionnaire. Following clinical examination, participants were referred for three consecutive spermograms. Data on the results of spermogram, demographic and clinical variables were summarized as frequencies and percentages using SPSS version 20. The frequency and percentage of each variable were presented on tables. This study enrolled 94 participants aged between 25 to 53 years (mean 39.21±10 years). Concerning the sperm abnormalities, most participants had Severe Oligoasthenozoospermia (62.7%), followed by those having severe Oligoasthenozoospermia with necrozoospermia (13.8%). The majority (60.6%) of them had *Chlamydia trachomatis* (titre IgG > 128) followed by 12.7% of others who had a varicocele. Severe Oligoasthenozoospermia was the most prevalent sperm abnormality and *Chlamydia trachomatis* was the most prevalent infectious risk factor. In Cameroon, the rate of male infertility is increasing but can be prevented by sustainable health education programme targeting exposure to socio-behavioural risk factors favouring sperm abnormalities.

Keywords: Sperm abnormalities, risk factors, male infertility

INTRODUCTION

Infertility is the failure to achieve a clinical pregnancy after twelve months or more of regular unprotected sexual intercourse or due to an impairment of a person's capacity to reproduce, either as an individual or with his/her partner [1]. Infertility is a general reproductive problem in Africa particularly in the Sub-Sahara. It affects between 8 and 12% of reproductive-aged couples worldwide.

A study reported that 30-40% males were partly the cause of infertility. Among them, 20% were the sole cause of the condition [1]. In Douala (Cameroon) where primary infertility was found to be more frequent, the frequency of male infertility was 5.6% [2]. There are disparities in the prevalence of male infertility across countries with high prevalence being observed in low resource countries. Clinical factors justifying such variance include urogenital infections, hormonal disorders and chronic diseases [3]. Additional factors related to their lifestyle such

as tobacco smoking, alcohol, psychological stress and dietary practices have also been suggested [4]. These risk factors were found to be associated with the production of abnormal spermatozoa parameters like azoospermia, oligozoospermia, teratozoospermia and/or asthenozoospermia used for the diagnosis of male infertility [5]. On the basis of abnormal spermatozoa results, more than 90% of male infertility resulted from oligospermia, teratozoospermia, or both in a study Cameroon [6].

Given that the sperm quality is the most widely accepted diagnostic marker of male infertility in most settings, the WHO has advocated standard operating procedures for sperm parameters analysis [7]. In Cameroon, the rate of a male presenting at medical consultation for infertility complaints is increasing. The situation is being aggravated by the unhealthy lifestyle of most males in our country presumably as the result of their poor socio-economic status. Unfortunately, up till now, the Cameroon Government has no planned programme focusing on male infertility. Our objective was to determine the prevalence of abnormal sperm quality and to describe factors related these disorders in infertile participants visiting four hospitals in Douala.

MATERIALS AND METHODS

Study Design

We conducted a descriptive cross-sectional study starting from the 1st of January 2010 to the 31st of December 2020 in purposely selected health facilities offering specialized reproductive health services in Douala the economic capital of Cameroon.

Study Sites

Douala is at the same time the regional capital of the Littoral region. The study was implemented at the Douala General Hospital and the “Clinique de l’Aéroport”, Douala. The Douala General Hospital, one of the six reference Hospitals in Cameroon created in 1992 is located in the Beddi area in Douala. It offers multidisciplinary services including gynaecology and obstetrics. The “Clinique de l’Aéroport” created in 1987 is a specialized private institution neighbouring the Douala Airport offering gynaecology and In vitro fertilization services. Both institutions were purposely chosen for their assessability and high frequentation by couple with fertility problems. The “BIOMEDICAM” biology Laboratory was also chosen for sperm analysis and Chlamydia trachomatis serodiagnosis.

Selection of Participants

The study targeted males with fertility complains. All those visiting the study sites were sensitized to take part in the study. During the study period, we registered 220 volunteers aged between 25- 53 years. Following the inclusion criteria, ninety-four (94) males were consecutively sampled for the study.

Inclusion Criteria:

We included in the study, consented infertile males with abnormal sperm quality and chlamydia IgG level equal or greater than 128.

Exclusion Criteria:

We excluded from the present study, participants who lack financial means for the laparoscopy of the spouse, those with no temperature measurement in the partner for 03 consecutive cycles,

those with no motivation for 03 spermograms consecutively, those whose spouses presented with adnexal obstructive / adherent sequelae of pelvic inflammatory disease at the laparoscopy, and those whose spouse presented at laparoscopy with adnexal endometriosis (endosalpingiosis, endometrioma).

Data Collection

Data on participant's demographic (age and gender), behavioural (tobacco smoking, alcohol consumption, contact with pesticides), and clinical (surgical treatment of inguinal hernia and varicocele) variables were collected using questionnaires. Each participant filled his questionnaire in a private hall without the aid of the researchers. The filled questionnaire was handled to the researchers who verified for mistakes and its completeness. Incompletely filled questionnaires were excluded from the study at the end of each working day. Following clinical examination for the diagnosis of varicocele, each participant was requested to go for 3 consecutive spermograms at the "BIOMEDICAM" biology Laboratory if: no pathology related to fertility was identified in the spouse, the chromotubation test (for tubal patency) was bilaterally positive, the temperature curve had been biphasic during the 03 cycles preceding the laparoscopy, and the Hühner test was normal.

Definition of Variables

Participants who declared no pregnancy since 2-5 years were identified to have secondary infertility and those who had never been pregnant were identified to have primary infertility. A participant was considered to have a history of Chlamydia if the serum level of Chlamydia IgG was at least 1/128. Also, those who declared tobacco smoking for a period of at least 06 months, regardless of the type of tobacco or the amount of tobacco consumed daily were considered as smokers. Lastly, alcoholic participants were those who consumed at least 40g of alcohol every day for at least 06 months. Following the spermogram, participants with the following conditions were identified to have abnormal sperm quality: Oligospermia, azospermia, severe oligoasthenozoospermia, severe oligoasthenozoospermia with necrozoospermia, severe oligoasthenozoospermia with teratozoospermia, severe oligoasthenozoospermia with teratozoospermia and necrozoospermia, and Hypospermia.

In order to minimize selection bias, participants were giving an equal chance to participate in the study. Also, a banner with message about the study was displayed at the hospitals. Simultaneously, the consulting personnel were requested to refer all suspected cases of male infertility to the research team. Also, a structured questionnaire with "yes" and "no" response written in simple English and translated into French considering the bilingual characteristic of Cameroon was independently filled by each consented participant.

Ethical Consideration

Before the beginning of the study, we obtained an ethical clearance from the Institutional Review Board of the Institute of Health Sciences. University of Bangangté Cameroon. During the study, we briefed each participant on the benefits of the study and assured them on the confidentiality of their results. A verbal/written informed consent was also obtained from them before sample collection.

Statistical Analysis

Information obtained from participants was computerized and later analysed using SPSS version 2013 software. Participants with incomplete information were not counted in the final

analysis. Data were collected from participants using a questionnaire. A question with “yes” response was carried one (1) mark while that with “no” response was given zero (0) mark. The “yes” responses were later summed up to provide the overall frequency of each variable. Qualitative variables (age) were expressed as mean and standard deviation. Other socio-behavioural (alcohol consumption, smoking, and the use of pesticides), clinical (spermogram, and chlamydia infection) variables were expressed as frequencies and percentages and the results displayed in tables.

RESULTS

Characteristics of Study Participants

Of the 220 volunteers, 94 were enrolled in this study giving a response rate of 42.8%. They were aged between 25- 53 years (mean 39.21 ± 10 years). Regarding their fertility status, 61.7% of them who declared no pregnancy since 1-5 years (average 3 years) were diagnosed with primary infertility while 38.2% (n=36) others who declared no pregnancy since 2-7 years were diagnosed with secondary infertility.

The age of participants was in line with the law in the country (Article 52 of Order No. 81-02 of June 29, 1981) which stipulates that the minimum age of a couple is 15 years for girls and 18 years for boys. However, the mean age may vary from one study to another. Also, low response rate observed in this study might be due to the low hospital frequentation by most males who often attribute the causes of the fertility of the couple to women. But this study revealed high prevalence of primary infertility (61.7%). Other studies in Cameroon also revealed high prevalence of primary infertility in male ranging from 65.7% in Douala to 70% in Yaoundé [2, 8].

Prevalence of Sperm Abnormalities in Study Participants

Table 1 shows that following spermogram, 59 (62.7%) participants had severe oligoasthenozoospermia (SOA), 13 (13.8%) had severe oligoasthenozoospermia with necrozoospermia (SOA + N), 08 (8.5%) had severe oligoasthenozoospermia with teratozoospermia (SOAT), 8 patients (8.5%) had severe oligoasthenozoospermia with teratozoospermia and necrozoospermia (SOAT + N), 4 had (4.2%) moderate oligozoospermia (MO), 4 (4.2%) had azoospermia (AZO), and 1 (1.0%) had hypospermia (Hsp).

The prevalence of male infertility is increasing in Cameroon. A study documented that, irregularly shaped and multi-tailed spermatozoa increase the severity of the infertility [9]. In this study, all participants had at least one of the parameters indicating abnormal sperm quality. Oligozoospermia was the most prevalent type followed by azoospermia. Similar findings were recorded in another study [10]. Sperm damage is now identified as a frequent cause of fertility disorder in Cameroon but with variance in geographical distribution [11, 12]. Abnormal sperm quality is a reversible condition if it is diagnosed earlier during routine medical check-up. Given that infertility almost always leads to the instability of the couple, male infertility can be prevented if males abstain from exposure to behavioural risk factors favouring abnormal sperm quality.

Table 1: Prevalence of sperm abnormalities among study participants

Abnormalities	Present [n= 94 (%)]	Abnormalities [n= 94 (%)]
Severe oligoasthenozoospermia	59 (62.7)	35 (37.3)
Severe oligoasthenozoospermia with necrozoospermia	13 (13.8)	81 (86.2)
Severe oligoasthenozoospermia with teratozoospermia	8 (8.5)	86 (91.5)
Moderate oligozoospermia	4 (4.2)	90 (95.8)
Severe oligoasthenozoospermia with teratozoospermia and necrozoospermia	4 (4.2)	90 (95.8)
Azoospermia	4 (4.2)	90 (95.8)
Hypospermia	1 (1.0)	93 (99.0)

Prevalence of Risk Factors for Sperm Abnormalities among Study Participants

Concerning factors associated with sperm abnormalities, Table 2 shows that *Chlamydia trachomatis* was the major risk factor (60.6%) followed in decreasing order by varicocele (12.7%), smoking (10.6%), alcohol consumption (8.5%), and contact with pesticides (3.1%).

Prevalence of *Chlamydia Trachomatis* Infection among Participants

This study recorded a high prevalence (55.9%) of participants with a history of chlamydia infection compared to another study (19.5%) which further noted that *Chlamydia trachomatis* was a common cause of male infertility in men [13]. That might be due to its role in the production of abnormal sperm responsible for male infertility [14]. But another contradictory study stipulated that Chlamydia infection in infertile males was not predictive of semen abnormalities since there was no observable link between the presence of these microorganisms in seminal fluid and infertility [15]. Despite that controversy, there is still another hypothesis suggesting that, sperm abnormalities is caused to the high concentration of free radicals which cause germ cells apoptosis [15]. Whatever the case, there is a need for a proper diagnosis and treatment of Chlamydia infection in men consulting for fertility problems.

We instead recorded a low prevalence (12.7%) of varicocele compared to a high prevalence (32%) documented in a previous study [16]. The disparity in both findings could be attributed to our sample size which was not large enough to justify the low prevalence of varicocele in our population. Despite that discrepancy, varicocele is a public health problem and affects up to 15% of men. While some author considers that, few men with varicocele encounter problems with fertility, another considers that infertility is their main complaint during medical consultation [16]. Given the potential role of varicocele in male fertility and testosterone production, there is a need for its clinical management and eventually, surgical treatment using the least time-consuming and conservative laparoscopic varicocelectomy [17].

About 10.6 % of our participants were smokers. A previous study reported up to 54.2% infertile men to be former or permanent smokers [18]. Despite the differences presented by both studies, tobacco smoking is common practice in Cameroon especially among men of the reproductive age. The effect of tobacco smoking on sperm quality might be dose and duration-dependent. A daily consumption of 14 cigarette sticks $\pm$ 7, and an average duration of exposure

of 06 ± 02 years was observed in this study compared to more than 20 cigarette sticks per day in another study [19, 20]. Given that tobacco smoking significantly lowers sperm density, mobility, and vitality, smoking cessation was suggested to have a restorative effect on semen quality [19, 20]. Unfortunately, smoking cessation among males and females in our country is challenging despite the effort of the Cameroon Government to restrict advertisement on tobacco and other drugs consumption.

Alcohol consumption either casual or chronic is a common habit among Cameroonian. This study revealed that 8.5% of participants were alcohol consumers compared to 60% in another study in Douala [2]. The differences in both findings might be due to the inclusion criteria. This study excluded casual consumption because of its negative prediction of infertility. The suggested effect of alcohol on semen quality could be dose-dependent since a daily alcohol consumption of < 40 g does not affect semen quality. But, heavy alcohol intake reduces sperm concentration, volume, and increases sperm DNA fragmentation [21]. That might be due to its interference in the production of GnRH, FSH, LH, and testosterone [4]. As such, excess estrogen and decrease testosterone observed in heavy alcohol intake [22] impairs with the functions of Leydig and Sertoli cells [4]. Such condition can be aggravated by the deficiency in essential vitamins and minerals necessary for reproduction [22]. Therefore, we recommend to men of the reproductive age to reduce their alcohol intake such as to prevent for its deleterious effect on their fertility.

Table 2: Prevalence of risk factors for sperm abnormalities among study participants

Risk factors	Prevalence [n= 94; (%)]
Absent	42 (44.6)
Present	52 (55.3)
<i>Chlamydia trachomatis</i>	
<i>Positive</i>	57 (60.6)
<i>Negative</i>	37 (39.4)
Variocoele	
<i>Present</i>	12 (12.7)
<i>Absent</i>	82 (87.3)
Smoking	
<i>Yes</i>	10 (10.6)
<i>No</i>	84 (89.4)
Alcohol intake	
<i>Yes</i>	8 (8.5)
<i>No</i>	86 (91.5)
Contact with pesticides	
<i>Yes</i>	3 (3.2)
<i>No</i>	91 (96.8)

CONCLUSION

Male infertility has become a common reproductive health concern in Cameroon. This study documented, primary infertility as the most prevalent form of male infertility. Regarding the sperm quality, severe oligoasthenozoospermia was the most common form of sperm

abnormality. Also, *Chlamydia trachomatis* was the most frequent risk factor affecting sperm quality. Our findings suggested that male infertility due to abnormal sperm quality is preventable by sustainable changes in men's lifestyles.

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