

Epidemiological and Etiological Profile of Infertility in Couples at Principal Hospital of Dakar in Senegal

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Abstract

Introduction: Infertility has been growing exponentially over the past thirty years, as couples, particularly women, increasingly delay their desire to become pregnant. Senegal, like other African countries, is paying a heavy price in terms of both the prevalence and impact of infertility.

Materials and Methods: retrospective, descriptive study during the period from January 1, 2022 to August 31, 2023 whose objectives were to describe the epidemiological aspects and the various etiologies of infertility in couples. Data were collected using a Kobocolect survey form and analyzed using Excel.

Results: The frequency was 5.5%. The mean age of our patients was 35.3 years and that of the partner 43 years. The couple's infertility was primary in 55.4% of cases, but 52.1% of women and 63.3% of men had secondary infertility. The average duration of infertility in the couples seen was 4.5 years. Infertility was predominantly female (61.7%), with a combination of two or more female etiologies in 28.7% of cases (ovarian (58.1%), uterine (37.7%) and tubal (31.1%)). One couple in ten (10.5%) was referred to MAP for in vitro fertilization. The success rate was 27%.

Conclusion: Infertility remains a global, multifactorial socio-cultural problem, with sometimes dramatic psychosocial consequences. It affects women in particular, especially in Africa, where the main purpose of marriage remains procreation, for which women continue to bear full responsibility.

Keywords: Infertility, Epidemiology, Causes and Senegal

1. Introduction

According to the World Health Organization and the International Monitoring Committee on Assisted Reproductive Technologies, infertility is defined as a couple's inability to conceive naturally after 12 months of living together (reduced to 6 months for women over 35), despite regular, unprotected intercourse without contraception [1-4]. This definition is based on the average monthly fertility rate of a normal couple, which is 20-25% [5]. Infertility can be primary or secondary. Primary infertility is the total absence of conception, while secondary infertility is defined as the inability to conceive again after one or more previous pregnancies, whatever their outcome (childbirth, miscarriage or ectopic pregnancy) [6]. This differentiation is important because of the frequency and better prognosis of secondary infertility [5]. Because of its frequency, couple infertility is a real public health problem. Its worldwide prevalence is difficult to establish accurately, due to the crying lack of precise

data [7]. It affects one in seven couples in the West and one in four in developing countries, giving a worldwide prevalence of 10-15% [2, 8, 9]. More than 186 million people worldwide suffer from infertility. Its incidence is associated with geographical differences, varying from country to country and even from region to region within the same country, with Asia and sub-Saharan Africa leading the global burden [2, 8, 9].

Based on studies carried out up to 2021, the WHO estimated that prevalence in developed countries ranged from 3.5% to 17.8% compared with 6.9% to 16.5% in developing countries [1, 3]. In some regions of the world, notably Central and South Asia, the Middle East, Central and Eastern Europe and Africa, the prevalence of infertility can reach 30% [2]. It is particularly high in sub-Saharan Africa, affecting 20% to 60% of couples [1, 9, 10]. An increasingly frequent reason for consultation, infertility has been growing exponentially over

the past thirty years, due to the desire for pregnancy, which is occurring later and later in couples, particularly women. Sexually-transmitted infections, historically the main causes of infertility, are gradually being replaced by endocrine and metabolic diseases such as hypothyroidism, diabetes and hypertension, hormonal disorders secondary to obesity and endocrine disruptors. The male factor (age), tobacco, alcohol, drug addiction and stress all contribute to amplifying this societal tragedy [5, 8, 10-12].

Procreation is strongly associated with an ultimate, even vital goal of completeness, happiness and family integration [3]. Thus, infertility has a negative impact on couple' quality of life, sometimes with enormous psychological repercussions in the West. In Africa, where reproduction is the woman's responsibility, infertility is a source of psychological distress, personality impairment, stigmatization, domestic violence, repudiation and economic hardship [1, 2, 8, 11, 13]. The management of this delicate problem calls for in-depth investigation of the couple, thanks to an arsenal of biological analyses and indispensable medical imaging. The range of therapeutic options is as wide as it is complex, reflecting social policy and global socio-economic inequalities.

Senegal, like other African countries, pays a heavy price for both the prevalence and impact of infertility. However, we are confronted with a lack of comprehensive and reliable epidemiological data. In order to contribute to the updating of national data, we decided to carry out a study in the gynecology-obstetrics department of the Hôpital Principal de Dakar, with the aim of describing the epidemiological aspects and different etiologies of infertility in couples.

Table 1: Distribution of patients by age group

	Headcount	Percental
<25	19	7,1
25 - 29	40	15,0
30 - 34	54	20,2
35 - 39	71	26,6
40 - 44	54	20,2
> 45	29	10,9
Total	267	100

The age range [35 - 39] (26.6%) was the most represented, followed by [30 - 34] (20.2%) and [40 - 45] (20.2%). One patient in 10 was over 45. The majority of patients (86.1%) lived in the suburbs of Dakar and 10.1% of couples came from the regions. The educational level of our patients (90.7%) was good, with 42.8% having attended university. Housewives represented 20.4% of the cohort. Thirteen patients (5.1%) had high-risk occupations (12 hairdressers and 1 chemist). The husband's profession was known in only 10.4% of cases. Indeed, patients rarely came to the consultation as a couple. Nearly a third (35.7%) of them were occupationally exposed. Their occupations were as follows: petrol station attendant

2. Patients and Methods

This was a retrospective, descriptive and analytical study conducted in the gynecology-obstetrics department of the Hôpital Principal de Dakar during the period from January 1, 2022 to August 31, 2023, i.e. a duration of 20 months. Our study population was represented by all women who consulted the service alone or as a couple during this period.

The parameters studied were as follows:

- socio-demographic characteristics (age, occupation, place of residence)
- marital status, conjugal lifestyle
- medical-surgical and gynecological-obstetrical history,
- type of infertility and any etiologies identified
- any treatment methods used and their results.

Data were collected using a Kobocolect survey form and analyzed using Excel.

3. Results

3.1. Frequency: Out of a total of 4,810 patients followed up in the gynecology-obstetrics department of the Hôpital Principal de Dakar from January 1, 2022 to August 31, 2023, i.e. 20 months, 267 patients had consulted for couple infertility, i.e. a frequency of 5.5%.

3.2. Patient Socio-Demographic Characteristics

The mean age of our patients was 35.3 years, with extremes ranging from 17 to 49 years.

The spouse's age was given in only 22% of cases, and averaged 43 years, with extremes ranging from 29 to 67 years. Table I shows the distribution of patients by age.

(1), soldier (4), mechanic (1) and driver (1). Emigrants accounted for 28.6% of spouses.

3.3. Marital Life

Almost all patients (89.3%) were in their first marriage, while 10.2% were in their second. One patient (0.37%) consulted us after her 3rd marriage. A quarter of spouses (24.3%) were polygamous (with 2 or 3 wives in 90.9% and 9.1% of casent respectively). However, the majority of couples were monogamous (75.7%). The average age of the husband's last child from a different marriage was 6.8 years, with extremes ranging from 1 to 25 years. Over half (61%)

of the couples had good exposure, with an average of 3 to 4 sexual encounters per week. Around four couples out of 100 (3.7%) had a very irregular cohabitation (1 month per year) because the husband lives abroad.

3.4. Distribution of Patients By History

The majority of patients had a regular menstrual cycle (54.1%), were nulliparous (60.6%) and had never had a miscarriage (76%). The number of abortions among our patients ranged from 1 (81.3%) to 8 (1.6%). The majority of patients (87%) had never used contraception. A history of pelvic surgery was reported by 21.7% of patients, with 41.6% having undergone caesarean section, 29.3% myomectomy, 12.1% ovarian cystectomy, 8.3% laparoscopic blue test and neosalpingostomy, 5.2% salpingectomy for ectopic pregnancy and 3.3% appendectomy. One synechia cure was reported, representing a rate of 1.6%

3.5. Assessment of the Infertile Couple

The couple's infertility was primary in 55.4% of cases. How-

ever, 52.1% of women and 63.3% of men had secondary infertility. The duration of infertility was less than or equal to 5 years in the majority of cases (74.2%). Only 4.8% of couples were infertile for more than 10 years. The average duration of infertility in couples seen for consultation was 4.5 years. The maximum was 24 years. The majority of patients (71.2%) had undergone an infertility assessment, although it was incomplete in 78.9% of cases. Only one man in ten (12.7%) had performed a spermogram. We lost sight of 78.3% of couples. The spermogram was normal in 29.4% of patients. Sperm abnormalities were dominated by oligoasthenoteratozoospermia (OATS) in 52.9% of cases, followed by azoospermia (11.8%). An exact etiological diagnosis of infertility could only be made in 23.5% of couples. Infertility was of mixed origin (male + female) in 7.2% of cases, while it was couple-related (irregular cohabitation) in 6.8% of cases. Male infertility was confirmed in 8.7% of spouses. Infertility was predominantly female (61.7%), with the association of two or more female etiologies in 28.7% of cases. Table II shows the different causes of infertility in couples treated in our department.

Table 2: Causes of infertility

	Headcount (n=137)	Percental
TUBAL CAUSES	n = 52	31,1%
Bilateral distal obstruction	23	44,2
Unilateral proximal obstruction	15	28,8
Unilateral distal obstruction	14	26,9
Bilateral proximal obstruction	9	17,3
Tubal adhesions	2	3,8
OVARIAN CAUSES	n = 97	58.1%
IOP	57	58,8
PCOS	23	23,7
Ovarian Cyst	15	15,5
Ovulation disorders	5	5,2
UTERINE CAUSES	n = 63	37.7%
Myoma	44	69,8
Polyp	17	27
Synechia	2	3,2
Malformation	2	3,2
HYPERPROLACTINEMIA	n = 5	3%
ENDOMETRIOSIS	n = 5	3%
MALE CAUSES	n = 25	
OATS	18	72
Azoospermia	4	16
Asthenospermia	2	8
Oligospermia	1	4

Female etiologies were dominated by ovarian causes (58.1%), followed by uterine (37.7%) and tubal (31.1%) causes. Hyperprolactinemia and endometriosis were found in a similar proportion of patients (3%). Bilateral distal tubal obstruction (44.2%) was the leading tubal etiology, followed by proximal and distal unilateral tubal obstruction in 28.8% and 26.9% of cases respectively. Ovarian failure (58.8%) was by far the most common ovarian cause. It was premature in 15% of cases. Polycystic ovary syndrome (PCOS) and ovarian cyst were found in 23.7% and 15.5% of patients respectively. Uterine causes were dominated by uterine myomatosis (69.8%), followed by polyps (27%). Only 12.7% of patients received medical treatment. Ten patients had ovulation monitoring combined with targeted intercourse. Seventeen clomiphene citrate stimulations were performed. A prolactin inhibitor and progestins (functional ovarian cyst) were prescribed in 5 and 2 patients respectively. Nearly one in four patients (23.6%) underwent surgical treatment. Thirty blue blood tests coupled with laparoscopic salpingostomy, sixteen myomectomies, twelve polypectomies and five ovarian cystectomies were performed. Nine varicocele cures and one surgery for testicular ectopia were also performed. One couple in ten (10.5%) was referred to MAP for in vitro fertilization. The indication for IVF was mixed in 39.3% of cases. In 60.7% of cases, the reason was male. Female indications were either tubal or ovarian.

Treatment was initiated in 74 couples (27.7%), resulting in 20 pregnancies, i.e. a success rate of 27%. The outcome of treatment for 52 couples (70.3%) remains unknown because they were lost to follow-up. Two therapeutic failures (clomiphene citrate stimulation) were recorded, representing a failure rate of 2.7%. Infertility was significantly associated with a history of pelvic surgery, with a p-value of 0.028. There was a close relationship between the husband's profession and the spermogram result (p-value 0.7). The latter was abnormal in all patients with occupational exposure. The presence of a varicocele was strongly associated with an abnormal spermogram (p-value 0.025).

4. Discussion

4.1. Frequency: Out of a total of 4,810 patients followed up in the gynecology-obstetrics department of the Hôpital Principal de Dakar from January 1, 2022 to August 31, 2023, i.e. 20 months, 267 patients had consulted for infertility of the couple, i.e. a frequency of 5.5%. The prevalence of infertility in our facility was rather low compared with the African trend. Indeed, the rates of couple infertility reported in African literature vary widely from country to country, ranging from 20 to 30% in Cameroon, 30.3% in Nigeria and 30% in Senegal, according to Kadima [14]. Other studies have reported prevalences of around 10% (9.9 -11.7% in Mali, 10.4% in Chad, 10.08% in Cameroon and 13.2% in Iran) [9, 15-18]. This low prevalence may be linked to the fact that women prefer to consult traditional practitioners. They come to us after many unsuccessful "treatments".

Our prevalence was rather close to that found by Zamaniyan et al in 2021 in northern Iran (4.9%) [2]. In contrast, Roupa

et al. Reported a very high frequency of around 64.5%, but their study was carried out in an assisted reproduction center [3].

4.2. Socio-demographic characteristics

4.2.1. Age: The mean age of patients was 35.3 years, with extremes ranging from 17 to 49 years, higher than that described in studies worldwide. African literature reports an average age ranging from 28.2 to 33.8 years [15]. It was 30 in Morocco; 28.9 in Chad; 28.3 in India and 26 in Côte d'Ivoire [9, 11, 19, 20]. The [35 - 39] age group (26.6%) was the most represented, followed by [30 - 34] and [40 - 45] (20.2%). Zamaniyan in Iran and Hichem in Algeria made the same finding, with 54.5% and 49.21% respectively [2, 21]. The age range [25 - 34 years] was often the most represented, as shown by Diabaté (50.7%) and Foumsou (55.4%) [9, 15]. The high age of our patients could be explained by the delay in consultation due to traditional practitioners. Another hypothesis would be late marriage at an advanced age due to university studies and professional ambitions, consequences of Westernization. In many European countries today, many women give birth to their first child at the age of 35 or over [8]. A woman's age is an important etiological as well as prognostic factor when it comes to fertility. Indeed, the problem with postponing the desire for children is that the decline in female fertility begins at the age of 30 and becomes more pronounced at 40. The chances of pregnancy at the age of 40 are less than half those of younger women, whereas in our series one in 10 patients was over 45 [13, 15, 19]. Age has a negative effect on the ovum, which consequently loses its reproductive capacities, i.e. completing a first division and starting the second meiotic division adequately [13].

The loss of fertility due to continuous depletion of the oocyte stock is age-dependent. It increases slowly from 4.5% at 25, 7% at 30, 12% at 35 and 20% at 38. Thereafter, it increases rapidly, reaching around 50% at age 41, almost 90% at age 45 and almost 100% at age 50 [8, 10]. Several studies show that most women are unaware that delaying childbearing increases the risk of infertility. They also mistakenly believe that medically assisted reproduction, in particular in vitro fertilization (IVF), can remedy the decline in fertility due to advancing age [8]. In our series, the spouse's age ranged from 29 to 67. Farnaz in Tehran (22 - 60 years); Fouda in Cameroon (22 - 48 years) and Niang in Senegal (23 - 64 years) reported similar figures [17, 22, 23]. Although rarely raised, paternal age has now been shown to have as deleterious an impact on a couple's fertility as maternal age. The probability of having a child decreases as paternal age increases. Sperm parameters are thought to be at their best between the ages of 30 and 35, with sperm quality declining slowly with age. Paternal age is therefore a determining factor in couples' fertility [19].

4.2.2. Education and Occupation

The women in our study were largely educated (90.7%), and in 42.8% of cases had a university degree, in contrast to other countries in the sub-region. Foumsou in Chad reported that 37.5% were uneducated [9]. Hichem in Algeria found 21.03% of patients with university education [21].

Our figures were closer to those in the West Roupa in Greece, Zamaniyan in Iran and Mohan in India found respectively 56.4%, 54.5% and 54.1% of women with a university degree [2, 3, 20]. Women would therefore prefer to pursue their studies and acquire a good professional career before considering having children, which results in a considerable delay in procreation.

4.2.3. Occupations

Thirteen patients (5.1%) had high-risk occupations (12 hairdressers and 1 chemist). The prevalence of infertility is higher in hairdressers than in women in other occupations, due to the handling of chemicals [24]. Almost a third (35.7%) of our patients were occupationally exposed. They had the following occupations: petrol station attendant (1), soldier (4), mechanic (1) and driver (1). In the series by Fouda in Cameroon, chauffeur was the most common occupation (11.94%) [17]. Niang in Senegal reported 13.4% military personnel and 5% drivers [23].

4.3. Marital life

Almost all patients (89.3%) were married for the first time, while 10.2% were married for the second time. One patient (0.37%) consulted after her 3rd marriage. The same observation was made by Diabaté in Mali (1st marriage 70.9%; 2nd marriage 18.7%; 3rd marriage 2.2%). Ashraf reported in his study that the remarriage rate was 3.5 times higher in infertile women [15, 24].

The majority of patients in our study were monogamous (75.7%), as were the series by Niang in Senegal (83.1%), Foumsou in Chad (60.7%) and Doumbia in Mali (87.3%) [9, 16, 23]. More than a third of couples (39%) had poor exposure, with less than 3 to 4 sexual encounters per week. Around four couples out of 100 (3.7%) had a very irregular cohabitation (>1 month per year) because the husband lived abroad. Emigrants accounted for 28.6% of spouses. Regular sexual relations, two to four times a week, starting shortly after menstruation, are a determining factor in the occurrence of pregnancy [8]. In fact, 83% of couples having sex more than three times a week will achieve pregnancy within 6 months [5].

4.4. History

Nearly half the patients had an irregular menstrual cycle of the spaniomenorrhoea type (45.9%). This would be due to their age, which was over 40 in 31.1% of cases, i.e. perimenopause, with a negative effect on fertility. The use of contraceptive methods was reported in 13% of patients, a figure similar to that of Doumbia (25.3%) [16]. In fact, 39.4% had already had a child. In addition to delaying pregnancy, the use of certain contraceptive methods exposes couples to sexually transmitted infections (STIs) responsible for male tubo-peritoneal and urogenital complications, which have consequences for fertility [13]. A history of pelvic surgery was reported by 21.7% of patients Diabaté found a similar rate (28.4%) [15]. All these procedures could cause adhesions to the genital tract, disrupting fertilization and/or implantation and thus compromising fertility.

4.5. Assessment of the infertile couple

4.5.1. Type of infertility: In our study, the couple's primary infertility rate was 55.4%. This predominance of primary infertility has been reported by Masoumi in Iran (69.5%) and Smina and Hammad in Algeria (> 90% of cases) [18, 25]. This could be explained by the fact that couples with primary infertility question themselves at an early stage and seek advice [26]. In the sub-region, secondary infertility, which has a better prognosis, predominates, as shown by the study by Diakitè in Mali (56.0%), Doumbia in Kayes (58.0%) and Foumsou in Chad (61%) [5, 9, 15, 16]. Secondary infertility is the most common form of female infertility worldwide, as shown by our study (52.1%), Mbaye in Senegal (60.4%) and Kouamé in Côte d'Ivoire (77.4%) [27, 11]. The frequency of sexually transmitted infections, unsafe abortions, post-abortion and post-partum infections could explain this preponderance [8, 27].

Male infertility tended to be primary, according to the literature: Niang in Senegal (66.5%); Frikh in Morocco (62%), in contrast to our results (63.3% secondary male infertility) [23, 28]. In fact, primary infertility is often due to male causes, whereas secondary infertility is predominantly of female origin [28]. These differences in profile are thought to be due to the varying prevalence of infertility factors in different parts of the world (age, lifestyle, environment, STIs).

4.5.2. Duration of infertility

Our patients consulted us fairly early (duration of infertility < 5 years in 74.2% of cases), which improves the prognosis [5]. These results are similar to those of Mbaye in Senegal (63.4%); Zamaniyan in Iran (55.2%) and Foumsou in Chad (67.9%) [27, 2, 9]. However, other West African authors reported a high consultation rate after 5 years of infertility Diabaté in Mali (56.0%); Doumbia in Kayes (56%). This delay is thought to be linked to ignorance, poverty and mystical beliefs [15-16].

4.5.3. Origin of infertility

Infertility was predominantly female (61.7%), in line with the worldwide trend: Tammy in the USA (58%); Zamaniyan in Northern Iran (62.6%) and Masouni in Iran (88.9%) [29, 2, 18].

The etiologies of female infertility can be subdivided into ovulation disorders, uterine anomalies, tubal obstructions, peritoneal factors and cervical factors. In our series, ovarian causes dominated (58.1%), followed by uterine (37.7%) and tubal (31.1%) causes. Masouni in Iran found the same distribution ovarian 50.3%, uterine 16.7%, tubal 15.4% and cervical 7.9%. We noted an overlap of causes in 28.7% of our patients [18]. In addition to age, other factors affect ovarian reserve: genetic factors, chromosomal abnormalities, autoimmune diseases, ovarian surgery, endometriomas, chemotherapy, radiotherapy and smoking [13]. In the series by Roupa in Greece, tubal causes occupied 1st place (27.4%), a result similar to that of Santiago in Argentina (utero-tubal-peritoneal factor 30%) [3, 13].

The contribution of environmental, occupational, genetic,

daily stress and lifestyle (obesity and sedentary lifestyle) factors is increasingly recognized [3, 13]. The origin of infertility may be exclusively female or male, but most often it is the consequence of hypofertility in both members of the couple, which synergistically impairs their ability to procreate. The male contribution varies widely, from total to partial, ranging from 20% to 70% depending on the series [7]. In the series by Tammy, Santiago, Foumsou and Masouni, it ranged from 26% to 30%, 30%, 41.7% to 66.3% and 66% respectively [29, 13, 9, 18]. Our study found a spermogram abnormality in 70.6%. The high rates of sperm abnormalities observed in our regions can be explained by the high frequency of sexually transmitted infections and varicocele [9]. In addition, there are significant differences between laboratories and even between technicians in the same laboratory, which can lead to misinterpretation of spermogram results [13]. Causes of male infertility include infections, genital trauma, vascular disorders (varicocele), anatomical variations, genetic factors, chromosomal abnormalities, anti-sperm antibodies, systemic diseases, toxins (tobacco, alcohol, drugs, endocrine disruptors), obesity and advanced age [2, 13, 29].

4.5.4. Lost to follow-up

In the course of our study, 78.3% of couples were lost to follow-up. The etiological work-up was carried out by 71.2% of patients, but was incomplete in 78.9% of cases. Only one man in ten (12.7%) had performed a spermogram. The economic burden of infertility is considerable. The lack of income for most women, the high cost of biological and radiological investigations, as well as of medical and surgical treatment and possibly MAP, explain why many patients give up during the course of treatment [15,24]. The low rate of male participation, on the other hand, is more likely to be due to the false empirical belief held by Africans that any erection followed by ejaculation is a sign of fertility [14].

5. Conclusion

Infertility, ranked by the WHO as the world's 5th most debilitating disease, remains a worldwide socio-cultural problem, often of multifactorial origin, with sometimes dramatic psychosocial consequences. Women often pay the heaviest price, particularly in Africa, where the main purpose of marriage remains procreation, for which women continue to bear full responsibility. According to the WHO, infertility treatment, whose first step is to identify the causes, is an important component of sexual and reproductive health and rights. It has benefited from a real scientific boom thanks to the advent, development and globalization of Medically Assisted Reproduction, which has raised the success rate of couples undergoing infertility treatment to 60%.

However, sub-Saharan Africa, and Senegal in particular, is not yet there. In our practice, we are confronted on a daily basis with the unavailability, inadequacy and/or inaccessibility of effective diagnostic and therapeutic technical resources in public health structures. What's more, the substantial financial burden for couples, but also for health policies, is a significant brake on the containment of this scourge. Thus, the most rational approach today remains the promotion of reproductive health, and the prevention and early man-

agement of genital tract infections, whether sexually transmitted, post-abortal or post-partum, in order to reduce this tragedy.

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