Scientific Research Publishing

Open Journal of Obstetrics and Gynecology, 2024, 14, 1786-1794
https://www.scirp.org/journal/ojog
ISSN Online: 2160-8806
ISSN Print: 2160-8792

The Evolution of Infertile Couples' Profiles in a Congolese Population during Sixteen Years of Observation

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How to cite this paper: Bikuelo, C.-J.B., Mboloko, E., Nzau, E.N., Mboloko, M., Kapend, M.M.Y., Monzango, G.S., Sendeke, P.M. and Modia, S.P.W. (2024) Paper Title. *Open Journal of Obstetrics and Gynecology*, **14**, 1786-1794.
https://doi.org/10.4236/ojog.2024.1411147

Received: October 17, 2024
Accepted: November 25, 2024
Published: November 28, 2024

Abstract

Background: Infertility is a dramatic situation for a couple, especially in the Sub-Saharan area, known as extremely pro-natalist. Until this day infertility of tubal origin due to infection sexually transmitted, post abortum or postpartum origin is the most frequent. Worldwide we are witnessing the transition of pathologies: from infectious to non-communicable ones. **Objective:** To analyze the evolution of infertile couples' profiles over time to improve management in the future. **Setting:** University clinic of Kinshasa and a private clinic, the Edith Medical Center. **Design:** A cross-sectional analytical study. **Patients:** A total of 4456 patients who sought care for infertility from January 1999 to December 2014 were enrolled. **Main Outcome:** The evolution of socio-demographic, clinical and paraclinical parameters of infertile couples over time. **Results:** The average age of female patients was 33.1 ± 5.7 years and it increased by 36 days every year and the male partner by 29 days per year. The average number of cigarette rods consumed decreased by 5% per year. The average intercourse frequency per week decreased by 2% every year. A fifth of patients (21.8%) were obese. And the average BMI increased by 0.04 kg/m^2 per year. Tubal occlusion was the main lesion found in hysterosalpingogram and diagnostic laparoscopy. **Conclusion:** Patients were more and more aged and gaining weight. A part from infection which is the main cause of infertility this day; in the future, infertility care providers will be facing non-communicable diseases, namely obesity.

Keywords

Infertility, Infertility in Sub-Saharan Area, Infertility in Low-Income Setting, Etiology of Infertility

1. Introduction

Infertile couples' profile evolution, that means, the way their characteristics change over time is very important in order to adapt their management. Infertility is a public health problem as more than 10% of couples are concerned worldwide [1] and around 25% in sub-Saharan setting [2] where infections remain the main etiologies. There are mostly from sexually transmitted diseases, bad hygienic conditions of deliveries and unsafe abortions [3]. However, in many domains of medicine, we are witnessing the transition from infection pathologies to non-communicable diseases [4] [5].

To highlight the risk factors and etiologies of infertility in our area, Leke; in 2013 evoked the role of infection [6] and Mboloko *et al.*, in 1996 stressed on the role of tubal occlusion and adhesions [7]. The itinerary of infertile couples was marked by a special route: most infertile couples commence by seeking care from general practitioners and then traditional medicine providers and pastors; finally, gynecologists [8]. Therefore, apart from other infertile causes the patients could acquire during that route, they became more and more aged.

Worldwide, owing to the evolution of technology, the betterment of the physical environment, and the improvement of hygienic rules and pharmaceutical arsenal; infectious diseases are decreasing while metabolic and degenerative diseases (obesity and diabetes) are increasing [9]. Previously, obesity was a matter of developed countries. Nowadays, in sub-Saharan Africa, the prevalence of obesity is increasing from 10% in the early 2000s, the frequency of obesity was around 25% - 30 % among women of reproductive age (15 to 49 years old) in 2008 [10]. That means, in the future, the reproductive medicine providers would be facing the consequences of non-communicable diseases, namely obesity [11]. Taking advantage of the availability of data from a relatively socially stable period in my country (no war and before COVID), we undertake this work.

The aim of the current study is to monitor the way infertile couple characteristics (clinical, paraclinical and etiologies) evolved over time, in a sub-Saharan area and to alert on the reality of the above-mentioned transition in infertility domain.

2. Material and Methods

The current study was cross-sectional analytical, and has been undertaken in two health institutions: University clinic of Kinshasa and Edith Medical Center, for 16 years: from January 1st, 1999 to December 31st 2014, a politically more stable period in our setting. The two institutions were run by the same medical staff with the same protocols of infertility management. Apart from the patients whose files were incomplete *i.e.* less than 50% of variables of interest were missing; a total of 4456 patients were enrolled. According to the year they started their consultation, patients were divided into four groups of four years. Four years is the laps time for fertility to decline [12].

Variables of interest were: patients and her partners' age, parity, gestity, number of unsafe abortions, jobs, marital status, infertility duration, menarche, history of

abdomino-pelvic surgery, male partner number of cigarette rods intake per day, number of the days of intercourse per week, the erectile dysfunction notion, he Body Mass Index (BMI) and the diagnosis after the two first visits; hormonal dosage: Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), Prolactin et Testosterone; endometrial biopsy (Novak), Post Coital Test (PCT), Hysterosalpingogram (HSG), Spermogram, ultrasound and laparoscopic findings.

Pauciparous was the patient who had delivered two or three viable newborns (≥28 weeks) and multiparous, more than three. The duration of infertility was the time elapsed from the beginning of the desire to conceive to the day of consultation. At anamnesis, male partners were asked about the number of cigarettes rods they can take a day; in the same way, the average number of the days of intercourse per week.

PCT was positive if there were more than 5 rectilinear motile sperms per high power field and negative when there were less than 5. For the BMI, patients were divided according to WHO classification [13].

Data were extracted from access 2003 database of the two medical institutions and analyzed by Stata IC12. Quantitative variables were summarized as mean and standard deviation, and qualitative variables as proportions. Pearson Chi2-test were used to compare proportions, analysis of variances for means comparison, logistic regression for the strength of association among variables and simple linear regression for prediction of some quantitative variables. The significative threshold was set at 5%.

3. Result

3.1. Patients Characteristics

The average age of patients was 33.1 ± 5.7 years ranging from 16 to 53 years. The majority of patients (60% were between 25 and 35 years old). The parity varied from 0 to 9, 60% were nulliparous and 23,4% had a history of unsafe abortion. Secondary infertility was the most frequent (66.9%). Almost all (97.5%) were married, with 12% in a polygamous marriage. Around half of patients (47.8%) were housewives.

Mean Infertility duration was 4.4 ± 3.9 years with the extreme of 1 to 28 years and more than two years for 60% of them. The average age of menarche was 13.8 ± 1.8 years. Almost a tenth of patients (8.5%) had late menarche (>16 years). A third (35%) had a history of abdomino-pelvic surgery with 13% of appendicectomy, and 8.6% of myomectomy. The average number of days of intercourse per week was 2.9 ± 1.4 with the extreme of 0 and 7. Almost a fifth (18.1%) of patients reported erectile dysfunction for their partners. The mean age of male partners was 40.2 ± 6.4 years with the extreme of 24 and 74 years and forty-four percent were more than 40 years. A 7% of partners were active smokers. The average BMI was 26.7 ± 5.1 kg/m^2 with the extreme of 14.1 and 42.5. After the two first consultations, genital infection was the main diagnosis (46.6%) followed by uterus myoma (24.7%).

Hormonal dosage (FSH, LH, Prolactin, Testosterone) was performed only for 275 patients (6%), and irrespective of the days of the cycle. Endometrial biopsy was performed for 1310 with pathologic finding for 80%: out of date endometrium (75%), nonspecific endometritis (3.9%) and tuberculosis endometritis (0.2%). Almost half of patients (51.3%) had tubal occlusion and half of male partners (56%) had spermogram anomalies with five percent of them, azoospermia. Sixty percent of them had anomalies in abdomino-pelvic ultrasounds: 45% uterus leiomyoma, 20% ovarian dystrophy (10% PCO). Among 122 patients who had diagnostic laparoscopy: 45% had tubal occlusion, 6% pelvic adhesions and 4% endometriosis.

3.2. Evolution of Patients Profile

Patients of 31 - 35 years were predominant, the proportions of patients less than 31 years decreased over time while patients of more than 36 years increased (Figure 1).

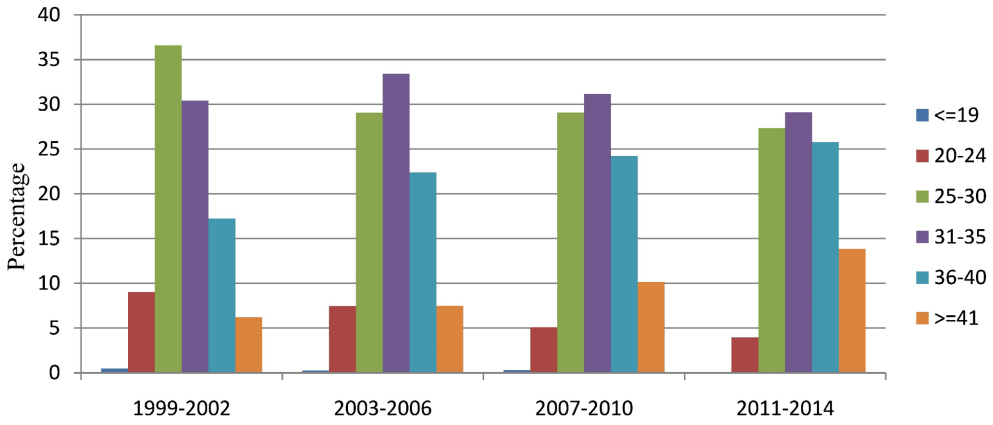

Figure 1. Evolution of patients age according to the four periods.

The average age of patients increased significantly (p = 0.000) and steadily from 31.5 ± 5.5 years for the first group to 33.9 ± 5.7 years in the last. The average age increased by 36 days every year (β = 0.10), which means 360 days every 10 years.

Male partners' age increased by 29 days per year (β = 0.08); an increase of 290 days every 10 years (Table 1). The smoking marked a reduction of 5% of cigarette rods (β = −0.05) per year. Intercourse frequency per week was reduced significantly (p = 0.000) by 2% every year (β = −0.02).

The proportion of male partners with erectile dysfunction decreased at the second and the third group; and raised at the fourth (p = 0.000). And the proportion of patients who conceived naturally decreased progressively from 12% to 6% (p < 0.000).

The average BMI increased from 25.3 kg/m^2 to 27.6 kg/m^2 with a gain of 0.04 kg/m^2 per year (Figure 2). At all the groups, the two most frequent diagnoses (genital infection and uterus myoma) frequencies increased significantly (p = 0.000) over time: respectively 14.3% and 8.3% in the first group, to 19.7% to 12.8% in the last group.

Table 1. Correlation between patients' characteristics and the years of observation.

Variables	β	SD	CI (95%)	R^2	p
Age patients	0.1	0.10	(0.08 - 0.12)	0.02	0.000
Age partners	0.08	0.01	(0.06 - 0.010)	0.01	0.000
Alcohol intake	0.02	0.007	(0.00 - 0.03)	0.0036	0.007
Tabacco	−0.05	0.02	(−0.10 - 0.002)	0.0021	0.059
Sex frequency	−0.02	0.05	(−0.12 - 0.08)	−0.004	0.000

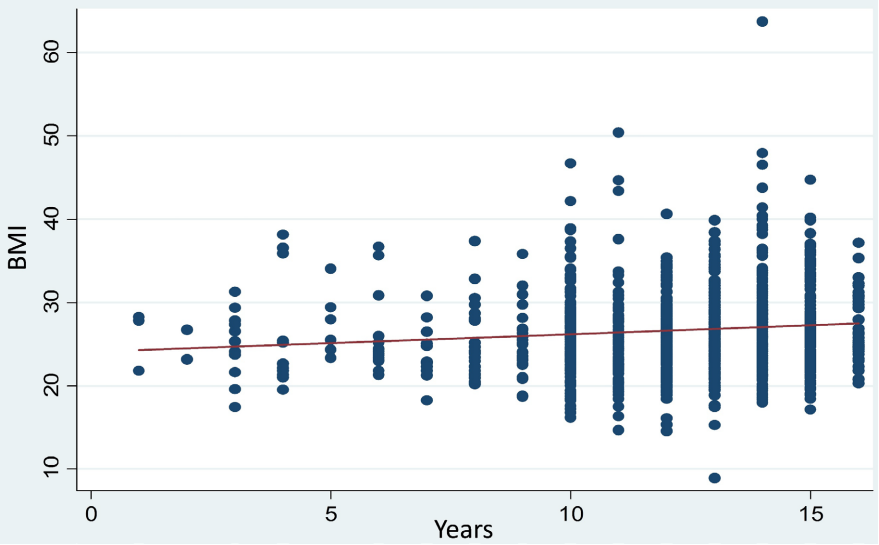

Figure 2. The evolution of BMI according to the years of observation.

Proportions of patients who realized paraclinical investigations increased over time: ultrasounds 7.0% and 46.3%; laparoscopy 4.0% and 42.2%; hormonal dosage 5.1% and 60% respectively at the first and the last groups. According to the findings: at ultrasound, myoma and ovarian dystrophy remained the main lesions found during all four groups, with a significative (p = 0.000) increase of uterus myoma (26.5% to 32.4%) and a decrease of ovarian cysts (15.9% to 6.9%) and PCO (17.7% to 6.6%).

At hysterosalpingogram and laparoscopy, tubal occlusions were the main lesions found. For laparoscopic findings, the proximal lesions decreased (28.6% to 20.6%) whereas the distal increased (14.3% to 34.3%) over time (p = 0.000). At endometrial biopsy, non-specific endometritis frequency decreased over the four periods, while tuberculosis endometritis frequency remained at 1.4% during the two previous groups and failed at zero four the last group. For the spermogram: the oligozoospermia frequency went down progressively (61.4% to 17.8%) while the azoospermia and leucospermia frequencies increased progressively: 1.6% to 5.8% for azoospermia and 4.7% to 44% for leucospermia.

4. Discussion

During the current study, the patients' mean age increased progressively (p =

0.000) from 31.4 to 33.9 years. The proportion of young patients (20 - 35 years) decreased over time: from 76.1% to 60.5% while the aged ones increased from 23.4 to 39.4% (p = 0.000). It means that patients were more and more aged when they decided to seek for infertility care. That progression was highlighted by the linear regression ($\beta = 0.10$): the average age increased by 36 days every year *i.e.* one year every decade. That is consistent with the previous findings by Mboloko *et al.* in 1996 in the same area with 29 years as average age [7]; whereas the same team in 2014 found this mean age to be 33 years [8]. Nowadays, the majority of young men and women postpone their parenthood project to be educated and get more stable jobs. Furthermore, the average duration of infertility has risen over time. To check the itinerary of infertile patients, we noticed that, in our setting, before seeing the specialist [8], patients went around alternative medicine (pastors, priests and traditional medicine providers). That constitutes a waste of time with as a consequence: patients more and more aged. According to Broekmans *et al.* [14]: the depletion of the ovarian reserve with decline in fecundability is accelerated from 35 and 37 years. Up to now, genital infections remained the main etiology of infertility; but in the future, reproductive medicine providers will face ovarian aging issues instead of infection and its consequences.

The increase of the proportion of nulliparous associated with the reduction of patients with unsafe abortion history raises the question of the reduction of non-desired pregnancies. Is it due to planning family policy or a change of sexual behavior? That is a question to be investigated.

The average intercourse frequency declined by 2% per year. Furthermore, the partner's average age increased progressively by 29 days per year. The testicular aging with the reduction of testosterone secretion [15] [16] could explain the reduction of intercourse frequencies and could also impact the natural conception rate, as noticed in the current study: 12.1% in the first group and 5.8% in the last.

The proportion of patients with secondary infertility increased during that study, from 62% to 72% and genital infection remains the main etiology of secondary infertility [3]. In our setting, the transition from infections to metabolic and degenerative etiologies is for the coming days. Indeed, the BMI increased progressively from 25.3 to 27.6 kg/m^2, with a progression of 0.04 kg/m^2; therefore, very soon the proportion of infertile patients who are obese will be too high, so that in reproductive domain they will face infertility of non-communicable disease origin [17]. We can explain this obesity by the Western people lifestyle adopted by our populations: nutrition with important weight gain. In western Africa countries, the prevalence of obesity was at epidemic level [18], the current study finds 21.8% and in a previous study [19] in our area (10.8%); Van der Steeg *et al.*, 2001 in Netherlands and Shukia *et al.*, 2002, in India, found that 30% of patients were obese. The difference between those populations is due not only to genetic factors but also to the style of live characterized by high consummation of fattish food [20]-[23]. Therefore impact of obesity associated with the worsening of the physical environment, namely pollution will negatively affect the fertility in

coming days. For the male partner, the increase in alcohol intake associated with a high proportion of spermogram anomalies and decreased of intercourse frequency highlights it is huge responsibility in couple infertility.

The proportions of patients who were investigated para clinically increased significantly during the study periods: for ultrasound 5.7% at the beginning and 49.2 at the last group; laparoscopy 3.9% and 42.3% finally for hormonal dosage 5.1% and 60%. That situation is due to the acquisition of material and refinement of infertility management. Unfortunately, that improvement of the technical platform did not go with the betterment of the conception rate; in contrast the reduction of clinical pregnancy rate: from 12.1% to 5.8%. That means we have not reached the right way in our infertility management: the lack of more advanced Assisted Reproductive Technology (ART) is the main explanation. ART is not only a need but a must for infertility care providers in our setting according to the etiologies encountered.

The weakness of the current study is its retrospective design but its strength is the high number of the population.

5. Conclusion

Over time the patients were more and more aged and gained weight with genital infection as the main etiology. In the days to come reproductive medicine, providers will face more and more degenerative and metabolic troubles of fertility.

Conflicts of Interest

There is no conflict of interest in that research.

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