

# Anti-Sperm Antibodies: Prevalence of Ig A and Ig G Positive Serology among Infertile Patients in Kisangani, Democratic Republic of Congo

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## Abstract

**Introduction:** Infertility in a couple is a stressful situation. Among the causes is the presence of antisperm antibodies that play a harmful role in reducing fertility and negatively influencing *in vitro* fertilization. The aim of this study is to determine their prevalence among infertile patients in Kisangani. **Patients and methods:** We conducted an analytical cross-sectional study in health facilities in the city of Kisangani. Of the 1379 patients who consulted for conception, 311 were tested for antisperm antibodies by ELISA. **Results:** Of the 311 patients, 121 tested positive (38.91%). Women were significantly more likely to be positive (p-value = 0.013). Ig G was positive in 32.48% of patients and Ig A in 10.93%. Age was a significant predictor of the number of positive patients (p-value < 0.001). Compared to patients of ≤30 years of age, having 31 to 40 years of age or 41 years of age and older increased respectively 2 and 3 times the risk of being positive. In secondary infertility, women are twice as likely to be positive. **Conclusion:** The prevalence of antisperm antibodies is very high among infertile patients in Kisangani with predominance among women. Older age increases the risk of positivity. This test should therefore be integrated into infertility investigations as often as possible.

## Keywords

Antisperm Antibody, Immune Infertility, Unexplained Infertility, Democratic Republic of Congo

## 1. Introduction

Infertility is a disease defined as the absence of clinical conception after 12 months or more of unprotected sexual intercourse, satisfactory in quantity and quality and at appropriate times or after insemination treatment using donor semen [1] [2] [3]. Not conceiving can lead to stress, depression, discrimination, ostracism etc. [4] [5]. This situation is worse in Africa where children are considered a source of wealth.

In Africa, the prevalence of infertile couples varies enormously from one region to another and even within the same region, reaching 30% - 40% in some regions [6] [7] [8]. A study conducted in Kasai, southern Democratic Republic of Congo (DRC), in 2010 reported a prevalence of 11% [9].

After evaluation of the infertile couple, in 30% of cases, the responsibility is exclusively female, in 30% exclusively male and in 30%, the responsibility belongs to the couple while in 10%, no cause is objective [10]. In the DRC, Juakali and Labama [11] in Kisangani found that 57.5% of men consulting for conception had a pathological spermogram while for women, Kalume *et al.* [12] in Goma found that in 67.6% of cases, tubal pathologies were found and in 38.1%, the causes were multifactorial. According to the American Society of Reproductive Medicine, in nearly 15% - 30% of couples, no cause will be found after a standard exploration of infertility [13]. Faced with the unexplained infertility dilemma, studies have been conducted for decades to investigate the immunological factors that may explain infertility. Already in 1922, Meaker [14] reported the presence of cytotoxic factors for sperm in the serum of 2 infertile women. And since then, several studies have been conducted and have highlighted antisperm antibodies (ASA) and their role in the occurrence of infertility [15]-[21]. Immunoglobulins G, A and M (Ig G, Ig A and Ig M) are essentially implicated in the occurrence of infertility in the sense that they may be responsible for a decrease in motility and cervical penetration of sperm as well as their interaction with the oocyte and even the development of the embryo [22].

Hamadaa *et al.* [23] showed that a remarkable percentage (about 40%) of infertile couples without a serious cause of infertility had circulating antibodies capable of agglutinating spermatozoa. These antibodies can be found in the blood, seminal plasma, sperm and cervical mucus.

The presence of Ig G and Ig A or Ig M alone or IgA alone is associated with a reduced fertilization rate and influences the results of *in vitro* fertilization (IVF). The specific effect depends on the subtypes of ASA [22]. Despite the different results of the role of anti-sperm antibodies in infertility, there is a failure to take into account the search for ASA when managing infertility.

In DRC, in the city of Kisangani, some doctors have recently begun to look for ASA when assessing infertility, however, there are no studies describing the prevalence of anti-sperm antibodies in our country.

The aim of this study is therefore to determine the prevalence of positive serology for ASA among infertile couples in the city of Kisangani.

## 2. Patients and Method

During the period of 2 years, from 1 January 2017 to 31 December 2018, we conducted an analytical cross-sectional study on 1379 patients who consulted 7 health facilities in Kisangani City (Cliniques Universitaires de Kisangani, Maki-so-Kisangani General Referral Hospital, Kabondo General Referral Hospital, HCKis, CELPA Hospital Centre, Reverend Mokili Hospital and COKIS Health Centre) for conception. Of these, we selected 311 patients in whom the search for circulating ASA in serum was performed. A part from that, their medical files should have all data needed for this paper. For ASA search, approximately 5 ml of the venous blood from each of the 311 patients was collected under an aseptic condition. For the separation of serum from whole blood, a centrifugation at 3000 rpm was performed for 5 minutes. Once the serum was obtained, the analysis was performed immediately. If this was not possible, the sample was kept in a sterile tube at a temperature of 2°C - 8°C until the time of analysis. The immunoglobulin test was performed by ELISA using the Stat Fax® 4700 device. All the tests were carried out in the Ema Esu laboratory, the only one carrying out this test in the city.

Positive patients were compared to the negatives one. Variables studied were age, gender and type of infertility.

Data were collected from medical and laboratory files were encoded using Excel. We used Epi Info® software version 7.2 for data analysis.

## 3. Results

During our study, we found that the prevalence of positive serology for ASA was 38.91%. This prevalence was higher among women (44%) than men (29.27%) with a statistically significant difference (p-value = 0.0133). Ig G was the most commonly found antibody (32.48%) with no statistically significant difference found (p-value = 0.1263). Ig A was positive in 17.36% of cases (**Table 1**).

As **Table 2** shows us, having an age between 31 and 40 years or ≥41 years respectively multiplied by 2 or almost 3 the risk of having positive ASA serology compared to those having ≤30 years of age. However, there was no statistically significant difference between patients aged 31 - 40 years and those aged 41 years and over. The Likelihood ratio test indicated that age was a significant predictor (p-value = 0.0000) of the number of ASA positive patients among infertile patients.

Taking into account the type of infertility (**Table 3**), we found no statistically significant difference between the 2 sexes while considering the presence of ASA during primary infertility (p-value = 0.4815). During secondary infertility, women are significantly more likely to have positive ASA serology (p-value = 0.0388) with twice as much risk than men.

## 4. Discussion

Infertility has often been described as one of the most prevalent chronic diseases

at any age [24]. Immunological infertility is one of the main causes of infertility through the production of antibodies against sperm and, in terms of conception failure, has become a serious health problem affecting approximately 1 in 5 couples of childbearing age [21] [25].

**Table 1.** ASA positive Serology and sexe of patients.

	Female N = 200	Male N = 111	Total of 2 sexes N = 311	p-value
Type of positive Ig	n (%)	n (%)	n (%)	
Ig A	35 (17.50)	19 (17.12)	54 (17.36)	0.9319
Ig G	71 (35.50)	30 (29.03)	101 (32.48)	0.1263
Ig A and Ig G	18 (9.00)	16 (14.41)	34 (10.93)	0.1426
Ig A and/or Ig G	88 (44.00)	33 (29.72)	121 (38.91)	0.0133

**Table 2.** ASA positive Serology and age of patients.

	Positive Ig A and/or Ig G n (%)	Negative Ig A and Ig G n (%)	p-value	OR (CI 95%)
Group I of comparison				
≥41 years	46 (65.71)	46 (39.32)	0.0004	2.9583 (1.5955 - 5.4851)
≤30 years	24 (34.29)	71 (60.68)		
Group II of comparison				
≥41 years	46 (47.42)	46 (38.66)	0.1949	1.4314 (0.8315 - 2.4639)
31 - 40 years	51 (52.58)	73 (61.34)		
Group III of comparison				
31 - 40 years	51 (68.00)	73 (50.69)	0.0142	2.0668 (1.1515 - 3.7095)
≤30 years	24 (32.00)	71 (49.31)		

Likelihood ratio test, p-value < 0.001.

**Table 3.** ASA positive Serology and type of infertility.

	Positive Ig A and/or Ig G n (%)	Negative Ig A or Ig G n (%)	p-value	OR (CI 95%)
<b>Primary infertility (N = 146)</b>				
Male	19 (27.94)	49 (72.06)	0.4815	1.2895 (0.6348 - 2.6193)
Female	26 (33.33)	52 (66.67)		
<b>Secondary Infertility (N = 165)</b>				
Male	14 (32.56)	29 (67.44)	0.0388	2.1405 (1.0315 - 4.4415)
Female	62 (50.82)	60 (49.18)		

The prevalence of ASA positive serology varies widely around the world. In the world, studies have shown that ASA serology is positive in 1% - 36% of infertile couples [20] [25] [26] [27] [28]. In Africa, Emad M Siam *et al.* [29] in Egypt and B.I. Adejuno *et al.* [30] in Nigeria found 20% and 28.2% respectively. In our study, of the 311 infertile patients in whom ASA serology was performed, 121 had ASA positive serology representing 38.91% of cases. Some authors agree that the prevalence of ASA varies significantly depending on the type of examination used for ASA research, but also the number of antibodies sought in patients and the location [28] [31]. In addition, other authors have found that during infections, patients can develop ASA by antigenic community between germs and sperm [32] [33]. The city of Kisangani being at the crossroads of provinces having a high rate of STIs [34] [35], this may therefore justify the high prevalence of ASA in Kisangani, as infections are among causes of ASA.

When comparing the prevalence of ASA in both sexes, it was significantly higher among women (44%) than among men (29.27%) ( $p$ -value = 0.0133). In India, Tripti N *et al.* [36] found seroprevalence of 39.19% in men and 40% in women.

In terms of Ig type, Ig G was the most commonly found antibody (32.48%). Ig A was positive in 17.36% of cases. Karimi F *et al.* [31] found positive serology in 8.2% of infertile patients for Ig G and 8.2% also for Ig A. As explained before, we think that the type of laboratory procedure can explain the difference.

In relation to the age of the patients, we found that being between 31 and 40 years of age or  $\geq 41$  years of age increased the risk of having positive ASA serology by a factor of 2 or almost 3 respectively compared to being 30 years of age. However, there was no statistically significant difference between patients aged 31 to 40 and those aged 41 and over. The Likelihood ratio test indicated that age was a significant predictor ( $p$ -value < 0.001) of the number of ASA positive patients among infertile patients. Hossain A and Col [28] also made the same observation.

Taking into account the type of infertility, we found no statistically significant difference between the 2 sexes while considering the presence of ASA during primary infertility ( $p$ -value = 0.4815) whereas during secondary infertility, women were significantly more likely to have positive ASA serology ( $p$ -value = 0.0388) with 2 times risk compare to men. In their study, Tripti N *et al.* [36] also found that among primary infertility cases, women were significantly more likely to be positive than men at secondary infertility with 21.36% versus 10.43%.

## 5. Conclusion

The prevalence of antisperm antibodies is very high in infertile Kisangani patients with predominance among women. Older age increases the risk of positivity. This test should therefore be integrated into infertility investigations as often as possible.

## Conflicts of Interest

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

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