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# Role of IgG Chlamydia antibody in predicting tubal factor infertility

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## Abstract:

**BACKGROUND AND OBJECTIVES:** Infertility is not a health problem, but a serious psychological trauma that affects the social status of women in the society. Treatment of infertility imposes a heavy economic burden on the family. Infertility can be due to a single or combination of causes and identification of the cause is essential for the proper management. *Chlamydia trachomatis* is one of the most common causes of tubal factor infertility. No recent study has been done in Kerala to assess the burden of *C. trachomatis* in genitourinary infections. The aim of the study was to assess the role of *C. trachomatis* IgG antibody in patients with tubal factor infertility among women with primary or secondary infertility attending the fertility clinic in a tertiary care hospital in Kerala.

**MATERIALS AND METHODS:** The study was done for one year and the sample size included 95 cases and 63 age-matched controls. Tubal disease was diagnosed by laparoscopy or hysterosalpingography. Serum samples of all the patients and controls were tested for *C. trachomatis* IgG antibodies by enzyme-linked immunosorbent assay.

**RESULTS:** Of the 95 patients with tubal pathology, 14 (14.7%) had antibodies to *C. trachomatis*. Of the 63 patients with normal tubes, 12 (19%) had antibodies. However, of the 26 patients who were positive for Chlamydia antibodies, 14 (53.8%) had tubal disease.

**CONCLUSIONS:** The prevalence of Chlamydia IgG in our study among women attending fertility clinic for the treatment of primary or secondary infertility is 26/158 (16.5%). Fifty-one (81%) patients had normal tubes.

## Keywords:

*Chlamydia trachomatis*, IgG antibody, tubal infertility

## Introduction

*Chlamydia trachomatis* is a Gram-negative bacterium, one of the four species in the genus Chlamydia, which is further classified into two biovars – TRIC agents and agents causing lymphogranuloma venereum.

*C. trachomatis* infection is the most common bacterial sexually transmitted infections worldwide and women carry the major burden of the disease.<sup>[1]</sup> The WHO 2005 prevalence estimates indicate that at any point in 2005, there were approximately 98 million adults infected with *C. trachomatis*

globally of which 59 million were female in the age group of 15–49 years.<sup>[2]</sup> It has been shown that developing countries have a high incidence of new Chlamydial infections. With the exception of sporadic testing for diagnostic and research purposes, Chlamydia screening is rarely done. No recent study has been done in Kerala to assess the burden of these genitourinary infections among infertile women. Hence, this study aims to assess the role of Chlamydia IgG antibody in patients with tubal factor infertility among women with primary or secondary infertility attending fertility clinics in a tertiary care hospital in Kerala.

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## Materials and Methods

### Aim

The aim of this study was to evaluate the association of *C. trachomatis* IgG antibody with tubal infertility.

### Design

This was a case-control study.

### Settings

- Fertility Clinic, Department of Obstetrics and Gynecology, Sree Avittom Thirunal Hospital, Government Medical College, Thiruvananthapuram, Kerala, India
- Department of Microbiology, Government Medical College, Thiruvananthapuram.

### Duration

The duration of the study was one year from February 1, 2015, to January 31, 2016.

### Study population

Patients undergoing treatment for primary or secondary infertility with the presence of tubal disease diagnosed by laparoscopy were selected. The absence of free spill in one or both tubes, presence of peritoneal adhesions, hydrosalpinx or unhealthy appearance of the tubes were taken as evidence of tubal disease.

### Controls

Patients who were being treated for primary or secondary infertility without tubal disease in laparoscopy were taken as controls.

The sample size was calculated as 95 cases and 95 controls with normal tubes (without any hydrosalpinx, peritoneal adhesions, absence of spill on one or both tubes or unhealthy appearance of tubes on laparoscopy).

The study was done after getting clearance from the Institutional Ethics Committee. Patients who came with a complaint of infertility were examined by gynaecologists and laparoscopy/hysterosalpingography was done to diagnose the cause. Informed written consent was obtained from all the patients with tubal pathology and from the designated number without tubal pathology.

From all the consenting selected patients, 5 ml of venous blood was drawn to detect Chlamydia IgG antibodies. The serum was separated and samples were stored at  $-70^{\circ}\text{C}$  in the Department of Microbiology. Chlamydia IgG antibodies were detected by enzyme-linked immunosorbent assay (ELISA) (CT 054G-Calbiotech Inc.). The procedure in the product insert was followed.

Antibody index interpretation:

- $<0.9$  – no detectable antibody
- $0.9-1.1$  – borderline positive
- $>1.1$  – detectable antibody.

All borderline samples were retested and confirmed.

## Results

During this period, a total of 158 patients attended the fertility clinic. Of these, there were 95 patients with tubal pathology.

Of the 95 patients with tubal pathology on laparoscopy, 14 had IgG antibody to Chlamydia (14.7%). Of the 63 controls with normal tubes, 12 (19%) had Chlamydia antibody. The difference was not statistically significant ( $P = 0.474$ ). However, of the 26 patients who were positive for Chlamydia antibodies, 14 patients (53.8%) had tubal pathology [Table 1].

Tubal disease was predominant in the age group of 26–35 years (75%) [Table 2].

Of the 95 patients with abnormal tubes, 14 (14.7%) had antibodies to Chlamydia. Of the 63 patients with normal tubes, 12 (19%) had Chlamydia IgG antibodies [Table 3a].

Of the 95 patients with tubal disease, 61 patients (64.2%) had primary infertility and 34 (35.8%) had secondary infertility [Table 3b].

Of the 26 patients who were Chlamydia positive, 22 (84.6%) patients had primary infertility which was significant [Table 4].

There was no significant difference in the socioeconomic status of patients with and without tubal disease.

## Discussion

In the present study, the prevalence of *C. trachomatis* IgG antibodies among women with primary and secondary infertility was found to be 16.5% (26/158). This result is consistent with various studies worldwide and in India. Among women seeking health care for reproductive

**Table 1: Age distribution of the patients**

Age (years)	Tubal disease		Total, n (%)	$\chi^2$	df	P
	Present, n (%)	Absent, n (%)				
20-25	7 (7.4)	3 (4.8)	10 (6.3)	1.334	3	0.721
26-30	42 (44.2)	24 (38.1)	66 (41.8)			
31-35	29 (30.5)	22 (34.9)	51 (32.3)			
36-40	17 (17.9)	14 (22.2)	31 (19.6)			
Total	95 (100)	63 (100)	158 (100)			

**Table 2: Chlamydia IgG positivity**

Tubal disease	Chlamydia IgG		Total, n (%)	$\chi^2$	df	P
	Positive, n (%)	Negative, n (%)				
Present	14 (14.7)	81 (85.3)	95 (100)	0.512	1	0.474
Absent	12 (19)	51 (81)	63 (100)			
Total	26 (16.5)	132 (83.5)	158 (100)			

**Table 3a: Type of infertility**

Infertility type	Tubal disease		Total, n (%)	$\chi^2$	df	P
	Present, n (%)	Absent, n (%)				
Primary	61 (64.2)	47 (74.6)	108 (68.4)	1.891	1	0.169
Secondary	34 (35.8)	16 (25.4)	50 (31.6)			
Total	95 (100)	63 (100)	158 (100)			

**Table 3b: Presence of antibody**

Infertility type	Chlamydia IgG		Total, n (%)	$\chi^2$	df	P
	Present, n (%)	Absent, n (%)				
Primary	22 (20.4)	86 (79.6)	108 (100)	3.804	1	0.051
Secondary	4 (8)	46 (92)	50 (100)			
Total	26 (16.5)	132 (83.5)	158 (100)			

**Table 4: Socioeconomic status**

Socioeconomic class	Tubal disease		Total, n (%)	$\chi^2$	df	P
	Present, n (%)	Absent, n (%)				
APL	52 (54.7)	32 (50.8)	84 (53.2)	0.237	1	0.62
BPL	43 (45.3)	31 (49.2)	74 (46.8)			
Total	95 (100)	63 (100)	158 (100)			

APL: Above poverty line; BPL: Below poverty line

health complications, Chlamydia infection rates of 23.3%–33.3% have been reported from different parts of India.<sup>[3]</sup> The prevalence of *C. trachomatis* in asymptomatic and symptomatic women attending a gynaecology clinic at New Delhi was 4% and 30.4%, respectively.<sup>[4]</sup>

The risk factors include low socioeconomic status, multiple sexual partners and the use of intrauterine devices, while the protective factors are a higher age group and the use of oral and barrier contraceptives. In our study, there was no significant difference in the socioeconomic class between Chlamydia positive and negative patients.

Low, in 2008, reported rising rates of genital Chlamydial infections, but it is unclear if this is due to increased testing or a true increase in the incidence.<sup>[5]</sup> Among young women attending STD clinics, rates are well above 10% as reported by van Bergen *et al.* in 2006.<sup>[6]</sup>

Our study was done mostly on asymptomatic infertile women (10 patients had dysuria and six patients had tenderness on per vaginal examination) attending the fertility clinic, using ELISA to detect IgG antibodies indicating past infections and the prevalence was 17.6%. In a systematic review reported by Wilson *et al.*, 2002, on *C. trachomatis* among asymptomatic European women, the

prevalence ranged from 1.7% to 17% which is consistent with the result from our study.<sup>[7]</sup> One hypothesis to explain subfertility in patients with normal tubes but positive Chlamydia antibodies is that intratubal microdamage may have resulted from a previous Chlamydia infection that cannot be detected with conventional patency tests such as hysterosalpingography or laparoscopy.<sup>[8]</sup> Another hypothesis was the persistent *C. trachomatis* infection also elicits an autoimmune response to human heat shock proteins (HSPs) due to their structural similarity with Chlamydia HSP. Human HSPs play an important role in early pregnancy; animal as well as human research indicates that autoimmunity to human HSP exerts a negative influence on embryo development and implantation.<sup>[9]</sup>

All the patients and their spouses were treated with Doxycycline 100 mg twice daily for 7 days and patients are on regular follow-up.

## Conclusions

- The prevalence of Chlamydia in our study among women attending fertility clinic for treatment of primary or secondary infertility is 16.5%
- Tubal disease was predominant in the age group of 26–35 years (73%)

- Of the 95 patients with tubal disease, 61 (64%) had primary infertility
- Of the 63 patients with normal tubes, 12 had Chlamydia positivity. The difference is not significant
- The absence of Chlamydia antibodies cannot be taken as a marker for normal tubes.

### Recommendations

- Chlamydia screening cannot be used as a predictor to pre-pone or post-pone laparoscopy in suspected patients of tubal factor infertility
- As chlamydia has been shown to affect implantation, Chlamydia testing can be done before IVF and treatment given
- Further studies are required to identify the exact role of Chlamydia in tubal factor infertility rather than secondary infertility.

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### Conflicts of interest

There are no conflicts of interest.

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