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Original Research Article

Seroprevalence of *Chlamydia Trachomatis IgG* Antibody among Women Attending an Infertility Clinic at a Tertiary Care Hospital

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Abstract:

Chlamydia trachomatis is recognized as the most widespread bacterial sexually transmitted infection (STI) globally, disproportionately affecting women. WHO reported in 2008 that approximately 105.7 million new adult infections occurred worldwide. Among infertile women, the prevalence varies between 3.9% and 32%. Because a majority (70–75%) of infected women remain asymptomatic, clinical history alone is unreliable for diagnosis. Conventional diagnostic methods such as laparoscopy and hysterosalpingography can identify tubal blockage but are invasive and unsuitable for large-scale screening. In contrast, IgG antibodies to C. trachomatis remain detectable for years, making them a useful marker of previous infection and potential tubal pathology. Antibody-based screening is simple, cost-effective, and less invasive, thereby providing a valuable tool in infertility management. This study aimed to estimate the prevalence of C. trachomatis IgG antibodies among infertile women attending a tertiary hospital clinic, where no local seroprevalence data were previously available.

Methods: A comparative study was conducted on 80 infertile women aged 18–40 years at Cheluvamba Hospital, Mysore, along with 80 age-matched pregnant women as controls. All sera were tested for C. trachomatis IgG antibodies using ELISA.

Results: Among the infertile group, 80% had primary and 20% had secondary infertility. Primary infertility was most common between ages 21–30 years, while secondary infertility predominated among those aged 31–40 years. Anti-chlamydial IgG antibodies were detected in 5% of cases and 2.5% of controls. Of the positive infertile women, 75% had primary infertility, all were aged 21–30 years, all had irregular menstrual cycles, and all had infertility of less than three years' duration.

Conclusion: The presence of C. trachomatis antibodies was higher among infertile women than controls, suggesting that prior chlamydial infection is a potential risk factor for infertility. As tubal damage from this infection is preventable, antibody screening in asymptomatic women may facilitate early diagnosis and timely treatment. ELISA-based IgG detection offers a rapid, non-invasive, and cost-efficient approach to improving infertility care.

Keywords: Chlamydia trachomatis, Infertility, ELISA, Seroprevalence.

Introduction

Chlamydia trachomatis remains the leading cause of bacterial sexually transmitted infections worldwide, with women carrying the greatest burden and serving as reservoirs for transmission to partners. According to WHO estimates (2008), 105.7 million new cases occur annually in adults. Regional prevalence varies: 7.6% in the Americas, 2.6% in Africa, 1.1% in Southeast Asia, and 3.9% in Europe. Indian studies have reported prevalence as high as 43% among gynecology outpatients and 18.9% in STD clinic attendees, with an overall prevalence of about 10% in South India and 0.88% in Karnataka.

The prevalence of C. trachomatis among infertile women has been documented between 3.9% and 32% worldwide. In India, it has been detected in up to 60% of salpingitis and PID cases. Long-term complications include pelvic inflammatory disease (PID), chronic pelvic pain, ectopic pregnancy, and infertility. Estimates suggest that 15–40% of cervical infections progress to PID, of which 20% may lead to infertility.

Persistent infection and chronic immune response gradually destroy epithelial cells, resulting in

fibrosis and tubal occlusion. Although laparoscopy and hysterosalpingography are gold-standard tests for tubal pathology, their invasive nature limits their use for population-level screening. IgG antibodies to C. trachomatis are long-lasting, making serological testing an attractive option. Chlamydia antibody testing (CAT) has emerged as a safe, simple, non-invasive, and cost-effective method for identifying women at risk of tubal infertility.

Aims and Objectives

1. To assess the IgG seroprevalence of Chlamydia trachomatis in infertile women.
2. To correlate antibody positivity with age, duration of infertility, socioeconomic status, and clinical factors.
3. To compare antibody positivity in women with primary versus secondary infertility.

Materials and Methods

Study setting: The study was carried out at Cheluvamba Hospital, Mysore Medical College.

Inclusion Criteria: Women aged 18–40 years with primary or secondary infertility.

Exclusion Criteria: Infertile women with congenital genital anomalies, endocrine disorders (thyrotoxicosis, diabetes, hormonal imbalance, galactorrhea, hirsutism), or hypertension.

Study group: 80 infertile women within the age range of 18–40 years attending the infertility clinic over a 12-month period.

Control group: 80 age-matched pregnant women attending the antenatal clinic.

Specimen collection and testing: After informed consent, 5 ml venous blood was drawn aseptically, centrifuged, and serum stored at –20°C until tested. IgG antibodies to C. trachomatis were measured using a commercial ELISA kit as per manufacturer's protocol. The procedure involved incubation of sera, washing, addition of enzyme conjugate and substrate, and absorbance measurement at 450 nm.

Interpretation of results:

- Antibody index >1.1 = Positive
- Antibody index <0.9 = Negative
- 0.9–1.1 = Borderline

Validity was confirmed using calibrator and control values.

Results

This comparative analysis included 80 infertile women (study group) and 80 pregnant women (controls). All participants were tested for anti-chlamydial IgG antibodies using ELISA.

Table 1: Distribution of cases according to type of infertility

Type of infertility	Number of patients	Percentage (%)
Primary infertility	64	80%
Secondary infertility	16	20%
Total	80	100%

$\chi^2 = 31.25$

Interpretation: Primary infertility accounted for four-fifths of cases, while secondary infertility was seen in one-fifth.

Table 2. Age-wise distribution of infertility and control groups

Age group	Infertility cases (%)	Control cases (%)
<20 years	2 (2.5%)	2 (2.5%)
21–30 years	62 (77.5%)	62 (77.5%)
31–40 years	16 (20%)	16 (20%)
Total	80 (100%)	80 (100%)

Cramer's V = 0.00

Interpretation: The largest proportion of infertile women were in the 21–30-year group (77.5%), followed by 31–40 years (20%). Only 2.5% were below 20 years.

Table 3: Type of infertility across age groups

Age group	Primary infertility (%)	Secondary infertility (%)
<20 years	2 (3.1%)	0
21–30 years	58 (90.6%)	4 (25%)
31–40 years	4 (6.2%)	12 (75%)
Total	64 (100%)	16 (100%)

Cramer's V = 0.688

Interpretation: Primary infertility was predominantly reported in women aged 21–30 years (90.6%), whereas secondary infertility was more frequent among women aged 31–40 years (75%). The association between infertility type and age was statistically significant ($p<0.05$).

Table 4: Menstrual cycle pattern in study and control groups

Group	Primary infertility	Secondary infertility	Controls	Total
Regular cycle	13 (20.3%)	6 (37.5%)	80 (100%)	99 (61.9%)
Irregular cycle	51 (79.7%)	10 (62.5%)	0	61 (38.1%)
Total	64	16	80	160 (100%)

Cramer's V = 0.785

Interpretation: Menstrual irregularities were present in 38.1% of infertile women, whereas all control women reported regular cycles.

Table 5. Duration of infertility

Duration of infertility	Number of patients	Percentage (%)
<3 years	72	90%
≥3 years	8	10%
Total	80	100%

$\chi^2 = 51.20$

Interpretation: A majority (90%) of infertile women had infertility of less than three years.

Table 6. Socioeconomic status of infertile women (Kuppuswamy's scale)

Status	Primary infertility	Secondary infertility	Total
Upper middle	13	1	14
Lower middle	27	8	35
Upper lower	24	7	31
Total	64	16	80

Cramer's V = 0.148

Interpretation: Most infertile women belonged to the lower-middle socioeconomic class, followed by the upper-lower group.

Table 7. Anti-chlamydial IgG positivity in study and control groups

Group	Positive IgG	Negative IgG	Total
Infertile women	4 (5%)	76 (95%)	80
Controls	2 (2.5%)	78 (97.5%)	80

Cramer's V = 0.066

Interpretation: Anti-chlamydial IgG was detected in 5% of infertile women and 2.5% of controls. The difference was not statistically significant ($p>0.05$).

Table 8: Anti-chlamydial IgG in primary vs. secondary infertility

Group	Positive IgG	Negative IgG	Total
Primary infertility	3 (4.7%)	61 (95.3%)	64
Secondary infertility	1 (6.3%)	15 (93.7%)	16

Cramer's V = 0.029

Interpretation: Of the four antibody-positive infertile women, three had primary infertility and one had secondary infertility.

Table 9: IgG positivity by age group

Age group	Infertile (Positive/Negative)	Controls (Positive/Negative)
<20 years	0 / 2	0 / 2
21–30 years	4 / 58	2 / 60
31–40 years	0 / 16	0 / 16
Total	4 / 76	2 / 78

Cramer's V = 0.106.

Interpretation: All antibody-positive cases (study and control) were between 21–30 years. No statistically significant correlation between age and antibody positivity was found ($p>0.05$)

Table 10: Correlation of IgG positivity with menstrual cycle pattern

Cycle type	Infertile (Positive/Negative)	Controls (Positive/Negative)
Regular	0 / 19	2 / 78
Irregular	4 / 57	0 / 0
Total	4 / 76	2 / 78

Cramer's V = 0.116

Interpretation: All four antibody-positive infertile women reported irregular cycles. This association, however, was not statistically significant.

Table 11: Correlation of IgG positivity with duration of infertility

Duration	Positive IgG	Negative IgG	Total
<3 years	4	68	72
≥3 years	0	8	8
Total	4	76	80

Cramer's V = 0.076

Interpretation: All antibody-positive infertile women had infertility of less than three years' duration.

Discussion

Chlamydia trachomatis is currently the most common bacterial STI, with asymptomatic carriers estimated at 2–5% of the general population. While many infections remain silent, progression to PID and tubal damage can lead to infertility.

In this study, primary infertility (80%) was more common than secondary infertility (20%), consistent with earlier Indian reports. Most cases occurred between 21–30 years, reflecting the higher risk of STI-related reproductive tract infections in sexually active age groups. Secondary infertility was more frequent above 30 years, in agreement with findings from other Indian and international studies.

Menstrual irregularity was reported by 38.1% of infertile women, correlating with similar studies that noted a significant association between menstrual disturbances and infertility. Most primary infertility cases occurred within three years of marriage, suggesting that couples now seek medical evaluation earlier than in the past.

IgG seropositivity in this study was 5% among infertile women compared to 2.5% in controls. Although not statistically significant, this finding aligns with Indian studies showing seroprevalence between 5% and 10%. Declining rates compared to older studies may reflect improved awareness, earlier diagnosis, and government-led STI control programs.

All antibody-positive cases in our study occurred in younger women (21–30 years), with irregular cycles and infertility of shorter duration, indicating that chlamydial infections peak during reproductive years and contribute to early infertility. Socioeconomic analysis showed that most cases belonged to the lower-middle class, reflecting both vulnerability and limited healthcare access.

Conclusion

This study highlights the role of prior Chlamydia trachomatis infection as a possible contributor to infertility. Although antibody prevalence was low, it was higher among infertile women than controls. Younger age, menstrual irregularity, shorter duration of infertility, and lower socioeconomic background emerged as associated risk factors.

Since infertility caused by C. trachomatis is preventable, simple antibody screening can help detect asymptomatic cases and allow timely intervention. ELISA-based IgG detection is a practical, rapid, inexpensive, and non-invasive tool that should be incorporated into infertility evaluations, especially in resource-limited settings.

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