The Increased Incidence of Tubal Factor Infertility and Ectopic Pregnancy after *Chlamydia trachomatis* Infection

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Objective

The objective of this poster is to determine if there is a difference in the number of women faced with an ectopic pregnancy or tubal factor infertility based on a prior Chlamydia infection. The research focuses on the presence of *Chlamydia trachomatis* DNA in the female reproductive system.

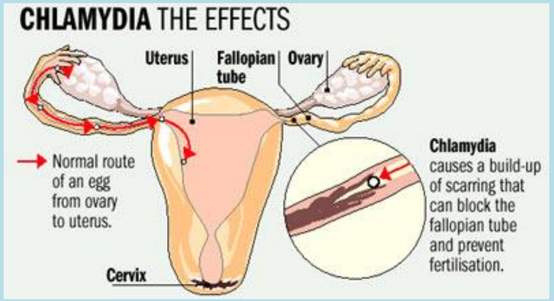

Figure 1: The effects of the sexually transmitted infection Chlamydia on the female reproductive system and fertility. Retrieved from **http://www.ayushveda.com/womens-magazine/how-to-care-for-infections-in-pregnancy/**

Abstract

Chlamydia is one of the most common sexually transmitted infections, with approximately 90 million new infections caught each year[4]. The infection is especially dangerous to fertility because it usually manifests itself as asymptomatic in most women. This poster will show the correlation between tubal factor infertility and ectopic pregnancy to prior Chlamydia infections. A study performed in the UK and West Indies investigated women that had either an ectopic pregnancy or women that were infertile due to their fallopian tubes[1]. Using PCR/Southern blotting and in-situ hybridization, three tissue samples from each of these women (endometrial, ovarian core, fallopian tube) were tested for the presence of *C. trachomatis* DNA. In the control group, only 5% tested positive for prior Chlamydia infection using the in-situ hybridization, and 15% when PCR/Southern blotting was used[1]. This is far less than the results of the tubal factor infertile group. In these women, 71% of them were positive using PCR/Southern blotting, and 43% using in-situ hybridization[1]. Overall, 79% of the tubal factor infertile women tested positive by either method for *C. trachomatis* DNA[1]. Out of the women tested for *C. trachomatis* DNA after having an ectopic pregnancy, 79% of them tested positive using both methods of analysis[1]. These results reflect the fact that the inflammation caused by the infection leads to fallopian tube scarring or blockage[3]. In conclusion, there is a connection between Chlamydia infections and the increased chance of tubal factor infertility or having an ectopic pregnancy[2]. To counter these growing trends, more women need to be tested for STIs so they can be quickly treated, avoiding major complications[5].

Materials and Methods

A study done in the UK and West Indies collected three samples (endometrial, ovarian core, fallopian tube) from three different groups of women: 50 controls, 24 ectopic pregnancy (EP) patients, and 14 patients with tubal factor infertility (TFI). All of the women ranged from 22 to 57 years of age when the samples were obtained. Each sample underwent both in-situ hybridization and PCR/Southern blotting to test for the presence of *Chlamydia trachomatis* DNA. The PCR confirmed presence using a 3' fluorescein-labeled oligonucleotide tag for the specific internal DNA region. In-situ hybridization was used in conjunction to improve the accuracy of the results. The *C. trachomatis* DNA was found using this method when the tissue slides showed a dark blue or purple color in the cells during light microscopy.

Table 3. Detection of *C. trachomatis* by PCR and ISH in the Sheffield and Bristol TFI group

Patient no.	DNA detection: PCR	DNA detection: ISH	Clinical history
84	–	+ (F)	NA
85	–	–	NA
86	–	–	NA
87	+ (F)	+ (F)	Primary infertility
88	–	–	NA
89	+ (E)	+ (E)	Secondary infertility, two miscarriages
90	+ (EF)	+ (EF)	Secondary infertility
91	+ (F)	+ (F)	Secondary infertility, one miscarriage
92	+ (O)	–	Secondary infertility
93	+ (EOF)	–	Primary infertility
94	+ (EOF)	–	Primary infertility, EP after tubal surgery
95	+ (EO)	–	Secondary infertility
96	+ (EO)	–	Secondary infertility
97	+ (E)	+ (F)	Secondary infertility, one miscarriage

E, endometrium; O, ovary; F, fallopian tube; NA, not available.

Table 2. Detection of *C. trachomatis* by PCR/Southern blotting and ISH in the Trinidad EP group

Patient no.	DNA detection: PCR	DNA detection: ISH	Clinical history
60	+ (OF)	–	NA
61	–	+ (F)	History of PID
62	NA	–	Fimbrial blockage
63	NA	–	One abortion
64	+ (F)	NA	History of PID
65	+ (OF)	NA	One abortion, history of PID
66	–	–	Primary infertility
67	+ (F)	–	NA
68	–	+ (F)	One previous EP
69	+ (O)	–	One abortion, PID and STD
70	–	+ (F)	NA
71	–	+ (E)	NA
72	–	–	NA
73	–	–	NA
74	+ (EF)	–	NA
75	+ (OF)	–	NA
76	+ (OF)	NA	NA
77	NA	+ (EF)	Two abortions
78	+ (EO)	NA	History of PID
79	+ (O)	+ (F)	NA
80	+ (OF)	NA	NA
81	+ (EOF)	NA	History of PID
82	+ (OF)	NA	NA
83	+ (EOF)	NA	History of PID

E, endometrium; PID, pelvic inflammatory disease; O, ovary; STD, sexually transmitted disease; F, fallopian tube; NA, not available.

Figure 2: Comparison of the results from the TFI group and EP group, showing which samples had detectable *C. trachomatis* DNA and respective patient variables. **(Barlow, R.E., et al. 2001).**

Results

In the control group of 50 patients, 16, or 32%, tested positive for *C. trachomatis* DNA using either one of the two methods (PCR or in-situ hybridization). This percentage is much smaller when compared to the TFI and EP groups. The TFI group tested 79% positive (11 out of 14 women) for *C. trachomatis* DNA using either method. PCR/Southern blotting found the DNA in 71% of the TFI patients, and in-situ hybridization found it in 43%. For the EP group, 19 out of 24 women tested overall positive for chlamydial DNA, which also equals 79%. PCR/Southern blotting caught the DNA in 67% and in-situ hybridization caught the DNA in 38% of the EP samples. Overall, levels of tubal factor infertility and ectopic pregnancy were much higher in women who had contracted Chlamydia at some point.

Conclusion

The studies done indicate that women who have had Chlamydia before are more likely to either have an ectopic pregnancy or be infertile due to scarring in the fallopian tubes. Chlamydia is known to be asymptomatic in most women, increasing the chance that the infection goes unnoticed and untreated. This leads to a buildup of scarring in the fallopian tubes that can prevent fertilization or prevent the fertilized egg from implanting in the uterus. Also, Chlamydia is often a precursor to pelvic inflammatory disease, which creates trouble regarding reproductive success. PID is another major cause of infertility due to its effect on the fallopian tubes and surrounding tissues. It is important that awareness about the STI is spread so that women are tested more often. An increase in technology could improve testing, which could in turn lower rates of ectopic pregnancies, which can be life threatening to both the baby and the mother. If Chlamydia is detected more quickly, rates of tubal factor infertility could also decrease because the infection would have less time to damage the fallopian tubes.

Applications to Biotechnology

Several advances in the field of biotechnology made these results possible. PCR/Southern blotting and in-situ hybridization are examples of technologies that have greatly increased scientific understanding in a wide variety of areas. Their usage in this study allowed the *C. trachomatis* DNA to be found in the tissue samples. Biotechnology can be further used to create more efficient STI testing, which has implications for not just reducing the risk for infertility, but also reducing mortality rates associated with undetected STIs.

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