A prospective study of genital infections in a family-planning clinic

2. Chlamydia infection – the identification of a high-risk group

M. E. MACAULAY[1], T. RIORDAN[1], J. M. JAMES[2], P. A. LEVENTHALL[2],
E. M. MORRIS[2], B. R. NEAL[2] AND D. A. ELLIS[3]

[1] *Public Health Laboratory, Withington Hospital, Manchester M20 8LR*
[2] *Community Health Services, Central Manchester Health Authority, Darbishire
House, 293a Upper Brook Street, Manchester M13 0FW*
[3] *Central Serology Laboratory, Withington Hospital, Manchester M20 8LR*

SUMMARY

During a study of genital infection in inner-city family-planning patients we examined 452 women for *Chlamydia trachomatis*. The prevalence of infection was 7·3%. There was no significant difference between patients attending because of genital symptoms and those who were attending for routine family-planning advice. Infection was found to be correlated with five main demographic parameters; age less than 25, no stable partnership, hormonal contraception, nulliparity and West Indian Ethnic origin. Using these parameters a simple scoring system was devised which allowed a high-risk population to be defined in whom screening would be economically justified.

INTRODUCTION

In contrast to *Chlamydia trachomatis* infection in the male which frequently causes a non-gonococcal urethritis, infection in the female is often asymptomatic. Chronic infection normally follows if no treatment is given, and may result in serious complications in both sexes. Thus Rahm and co-workers followed 109 chlamydia-positive teenage girls over a period of 3 months and 17·5% developed complications including several with salpingitis (1). Asymptomatic women also act as source of infection for their sexual partners. In addition babies can be infected during passage through the birth canal leading to conjunctivitis and occasionally life-threatening pneumonia (2).

The increasing interest in chlamydial infections makes it difficult to estimate whether they have become more prevalent. However, reports of non-specific genital infections and pelvic inflammatory disease, both of which are associated with chlamydial infection, increased by more than 25% between 1980 and 1986 (3).

One way of tackling the problem is to screen women in high-risk groups before symptoms develop, and to treat those found to be positive together with their sexual partners. It has been recommended that at risk populations should be

defined using demographic profiles (4). The incidence in family planning clinic (FPC) populations in studies in the USA is reported as between 6 and 23 % (5). In Britain an incidence of 8 % was found in women attending inner city general practices (6), and 7 % in urban antenatal clinics (7). Women attending FPCs are worth studying because a high proportion have not completed their families and are therefore vulnerable to the consequences of infertility following chlamydial pelvic inflammatory disease.

We estimated the prevalence of chlamydial infection in four local FPCs during a study of genital infection in this group (8). A detailed questionnaire was filled in on each patient and used to define a subpopulation with a particularly high rate of *C. trachomatis* infection.

METHODS

An endocervical swab was taken from all the 495 women in this study and sent to the laboratory in chlamydial transport medium (9). Chlamydia were cultured on cycloheximide treated McCoy cells which were stained with Giemsa before being examined for inclusions. There was no valid result for 65 patients. In 22 of these the swabs were re-examined using an ELISA test (IDEIA, Boots-Celltech); these results are included in the analysis giving a total number of 452 valid results.

The questionnaire, filled in for each patient, contained demographic social and clinical details. Routine microbiological culture was also done. The questionnaire and bacteriological methods used are described in our previous paper (8).

RESULTS

There were 33 chlamydial infections detected in the 452 patients, an overall prevalence of 7·3 %. The patients fell into two groups, those who came primarily because of symptoms, though they might also receive family planning advice, and those attending primarily for contraceptive advice although some of these admitted to symptoms on direct questioning. The prevalence was slightly lower for the patients attending primarily with symptoms 11/203 (5·4 %) compared with 22/429 (9·6 %) for routine FPC attenders, but this difference was not statistically significant, so the two groups of patients are combined in the analysis.

The information obtained on each patient was classified into three groups: group 1 could be ascertained by talking to the patient, group 2 by examining the patient and group 3 from the report on routine bacteriological examination of the patient.

Group 1 criteria

Table 1 shows the group 1 criteria. The first five were significantly associated with a positive chlamydia result and could potentially be used to identify a high risk group using a scoring system where each parameter scored one if positive. Fig. 1 shows the percentage of positives detected and the percentage of patients tested as the minimum score used to select patients rises. It suggests the criteria are used most efficiently if patients with a score of 3 or more are selected for testing. If this had been done two thirds of the positives would have been detected but only one third of the patients tested.

Table 1. *Correlation of chlamydia isolation with demographic factors (group 1 criteria)*

Criterion	Chlamydia positive		Chlamydia negative		χ^2	P
	Present	Absent	Present	Absent		
Hormonally based contraception	23	10	159	260	22·7	< 0·001
Age less than 25 years	24	9	161	258	17·6	< 0·001
No stable partnership*	28	5	203	216	11·2	< 0·001
Nulliparous	17	16	105	314	10·8	< 0·001
West Indian	13	20	83	336	7·0	< 0·001
Attended primarily because of symptoms	11	22	192	227	1·9	N.S.
Over one partner in past 6 months	3	30	26	393	0·4	N.S.
Symptoms discharge	18	15	210	209	0·2	N.S.
Pain in: back/pelvis/abdomen	7	26	121	298	0·8	N.S.
Deep dyspareunia	3	30	48	371	0·1	N.S.
Intermenstrual bleeding	5	28	58	361	0·1	N.S.

N.S., Not significant.
* Women who did not name their husband or boyfriend as head of household.

N. gonorrhoeae was isolated from 12 of the patients in the study, eight of these patients had a score of 3 or more, the same proportion of positives as found for chlamydia.

Group 2 criteria

Table 2 shows the group 2 criteria. As might be expected vaginal examination was not very helpful for identifying chlamydia positive patients. The most significant factor was cervical bleeding when the swab was taken, this being recorded for a quarter of the patients with chlamydia. Two of five women with a cervical polyp had chlamydia but these numbers are too small to be certain of their significance. There was some suggestion of an association between vaginal discharge or inflammation and chlamydia but this was probably because chlamydia were associate with other genital infections.

Group 3 criteria

Table 3 gives the group 3 criteria. The detection of clue cells in the vaginal swab was more strongly associated with chlamydia isolation than bacterial vaginosis itself and is an easier criterion to use. There was also a strong correlation with the detection of > 5 pus cells/high power field in a slide made from a cervical swab. Isolation of chlamydia was less strongly associated with the detection of *Neisseria gonorrhoeae* and *Trichomonas vaginalis*. Candida infection in this population was not associated with an increased isolation of chlamydia.
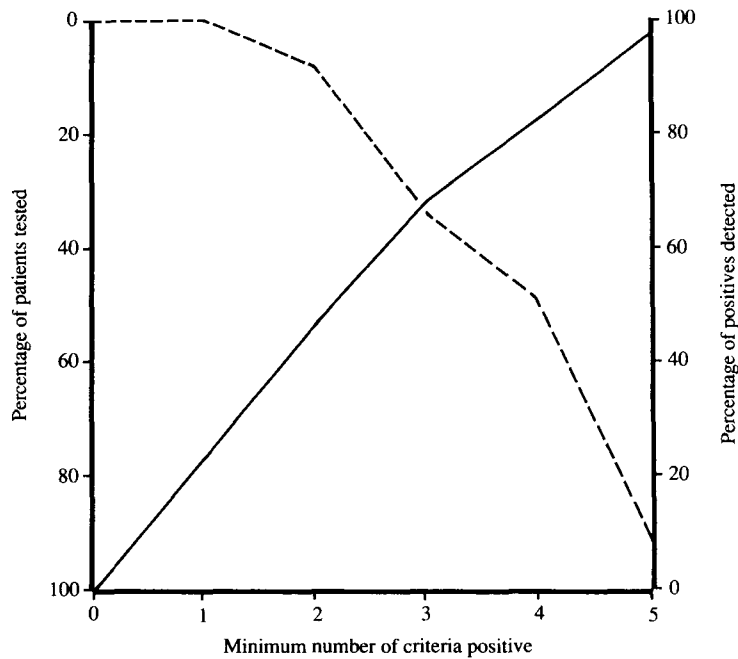
Fig. 1. Comparison of the percentage of patients tested (——) and the percentage of positives detected (– – –) as the minimum number of Group 1 criteria used varies.

Numerical data on which Fig. 1 is based

Minimum number of criteria	Percentage of positives detected (total number)	Percentage of patients tested (total number)
0	100 (33)	100 (452)
1	100 (33)	76·3 (345)
2	90·9 (30)	52·4 (237)
3	66·7 (22)	32·1 (145)
4	51·5 (17)	17·5 (79)
5	9·1 (3)	2·2 (10)

Table 2. *Correlation of chlamydia isolation with findings on examination (Group 2 criteria)*

Criterion	Chlamydia positive		Chlamydia negative		χ^2	P
	Present	Absent	Present	Absent		
Cervical bleeding	8	25	30	389	11·5	< 0·001
Cervical polyp	2	31	3	416	*	0·04
Yellow, green or purulent discharge	8	25	52	367	3·7	< 0·1
Vaginal inflammation	8	25	55	364	3·1	< 0·1
Frothy discharge	3	30	17	402	1·8	N.S.
Cervicitis	8	25	65	354	1·7	N.S.
Cervical erosion	9	24	74	345	1·8	N.S.
Smell	8	25	67	352	1·5	N.S.
Tender	5	28	55	364	0·1	N.S.

N.S., Not significant. * Fisher's exact test.

Table 3. *Correlation of chlamydia isolation with routine laboratory report (Group 3 criteria)*

Criterion	Chlamydia positive		Chlamydia negative		χ^2	P
	Present	Absent	Present	Absent		
Clue cells in vaginal swab	17	16	83	336	17·8	< 0·001
Cervical swab – > 5 pus cells/field	15	18	79	340	13·1	< 0·001
N. gonorrhoeae	4	29	8	411	*	0·007
T. vaginalis	8	25	34	385	9·4	< 0·005
Bacterial vaginosis	5	28	37	382	1·4	N.S.
Candida	3	30	61	358	0·7	N.S.

N.S., Not significant.   * Fisher's exact test.

DISCUSSION

Screening women in high risk groups will help to prevent the complications of chlamydial infection. This study was carried out to estimate the prevalence of chlamydial infection in women attending FPCs. The overall prevalence for all patients (7·3%) is significant, especially as half of the positive women had yet to start their families and would therefore suffer major consequences from infertility. Estimates of the cost of chlamydial infection have been made by workers in the United States. Washington and co-workers calculated that a conservative estimate of the economic cost of chlamydial infection was over $1·4 billion (10), and Phillips and colleagues suggested that it is more cost effective to screen for symptomless chlamydial infection than to treat the complications of untreated infection if the positive rate in a population is over 7% (5). Nevertheless it is unlikely that such a total screening service could be funded for British FPCs with this level of prevalence. Therefore, the second arm of the study was designed to investigate the possibility of defining a high-risk group whom screening would be clearly justified even with limited resources.

Handsfield and colleagues did a similar study in America and their criteria for screening were: age less than 25 years, intercourse with a new partner in the preceding 2 months, a purulent or mucopurulent cervical discharge, bleeding on swabbing the endocervix and use of either no contraception or a non-barrier method (11). Two of these criteria can only be determined by vaginal examination, limiting their value. We divided the criteria into 3 groups, the first group containing criteria which could be determined by asking the patient a few simple questions.

The five significant group 1 criteria in this study were age less than 25, hormonal contraception, no stable partnership, nulliparity and West Indian descent. The association with hormonal contraception has been described by other workers (7, 12, 13), and could be because it is an acceptable form of contraception for the young or because it does not provide a barrier to infection. Gall suggests that infection is reduced by the use of a barrier method such as a sheath (14), though in the present study 3 of 49 (6·1%) patients using a sheath had a chlamydial

infection. Louv and co-workers adjusted their results for demographic and behavioural characteristics and still found a significantly higher incidence in women using oral contraception (12).

Handsfield found intercourse with a new partner within the preceding 2 months was a significant factor (11). Our equivalent category was more than one partner in the last 6 months and we were unable to detect any association between this and chlamydia isolation. This may well be due to the unreliability of the answer when the question is posed in a busy clinic. We also asked who was the head of household and classified women answering husband or boyfriend as having a stable partnership, in contradistinction to those answering parent or self. No stable partnership correlated positively with chlamydia isolation.

A third of the patients had three or more of our criteria present and this group included two thirds of the positive patients. The prevalence rate in this group was 15·2 % (22/145) and screening is clearly worthwhile. There is probably no way of detecting all of the positive patients other than by a comprehensive screening programme.

As with other studies we found that many of the cases identified did not have diagnostic features, However, when patients are examined, the finding of an abnormal cervix which bleeds on contact, or the presence of a purulent cervical discharge, should prompt one to take specimens for chlamydia. Although we found a high correlation with abnormal laboratory findings such as the detection of clue cells, a large number of pus cells in the cervical swab or the isolation of *N. gonorrhoweae* or *T. vaginalis*, this information will clearly not be available at the initial visit and therefore is of limited value in selecting patients.

As a result of our study we feel that selective screening for chlamydia is fully justified in our clinics. There are likely to be fluctuations in prevalence of chlamydia in different areas and it would seem reasonable to perform a preliminary evaluation before applying our results to a different family-planning clinic population.

REFERENCES

1. Rahm VA, Belsheim J, Gleerup A, Gnarpe H, Rosen G. Asymptomatic carriage of *Chlamydia trachomatis* – a study of 109 teenage girls. Eur J Sex Transm Dis 1986; **3**: 91–4.
2. Schachter J, Grossman M, Sweet RL, Holt J, Jordan C, Bishop E. Prospective study of perinatal transmission of *Chlamydia trachomatis*. JAMA 1986; **255**: 3374–87.
3. Public Health Laboratory Service Communicable Disease Surveillance Centre. Sexually transmitted disease in Britain: 1985–6. Genitourin Med 1989; **65**: 117–21.
4. *Chlamydia trachomatis* infections – policy guidelines for prevention and control. MMWR 1985; **34**; ES: 53S–74S.
5. Phillips RS, Aronson MD, Taylor WC, Safran C. Should tests for *Chlamydia trachomatis* cervical infection be done during routine gynecological visits. Ann Int Med 1987; **107**: 188–94.
6. Southgate LJ, Treharne JD, Forsey T. *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections in women attending inner city general practices. Br Med J 1983; **287**: 879–81.
7. Wood PL, Hobson D, Rees E. Genital infections with *Chlamydia trachomatis* in women attending an antenatal clinic. Br J Obstet Gynec 1984; **91**: 1171–6.
8. Riordan T, Macaulay ME, James JM, Leventhall PA, Morris EM, Neal BR, Rowland J, Evans BM. A prospective study of genital infections in a family planning clinic. 1. Microbiological findings and their association with vaginal symptoms. Epidemiol Infect 1990; **104**: 47–53.

9. Richmond SJ. The isolations of chlamydia subgroup A (*Chlamydia trachomatis*) in irradiated McCoy cells. Med Lab Technol 1974; **31**: 7–9.
10. Washington AE, Johnson RE, Sanders LL. *Chlamydia trachomatis* infections in the United States. What are they costing us? JAMA 1987; **257**: 2070–2.
11. Handsfield HH, Jasman LL, Roberts PL, Hanson VW, Kothenbeutal RL, Stamm WE. Criteria for selective screening for *Chlamydia trachomatis* infection in women attending family planning clinics. JAMA 1986; **255**: 1730–4.
12. Louv WC, Austin H, Perlman J, Alexander WJ. Oral contraceptive use and the risk of chlamydia and gonococcal infections. Am J Obstet Gynecol 1989; **160**: 396–402.
13. Harrison HR, Costin M, Meder JB, Bownds LM, Sim DA, Lewis M, Alexander ER. Cervical *Chlamydia trachomatis* infection in university women: relationship to history, contraception, ectopy, and cevicitis. Am J Obstet Gynecol 1985; **153**: 244–51.
14. Gall SA. Oral contraceptives and chlamydia infection. JAMA 1986; **255**: 38.