ORIGINAL ARTICLE

Chlamydia trachomatis prevalence in men in the mid-west of Ireland

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Objectives: To estimate the prevalence of chlamydia infection in young men in the Mid-Western Health Board Region of Ireland, and to determine risk factors for its acquisition.

Methods: Consecutive men attending orthopaedic clinics (OPD), and a university sports arena (UL) were recruited to a chlamydia prevalence study. All men aged 17–35 who had been sexually active and had not passed urine in the last hour were eligible. Information about chlamydia was given, informed consent obtained, and a self administered questionnaire was completed. A first void urine (FVU) was collected and tested by ligase chain reaction (LCR).

Results: 82% (207/252) of men from OPD, and 60% (186/310) from UL participated. 6.3% (13/207) from the OPD and 5.4% (10/186) from UL tested LCR positive, giving an overall prevalence of 5.9% (23/393). Proved risk factors for chlamydial positivity were: (1) more than one sexual partner in previous 6 months, (2) more than eight lifetime sexual partners, (3) current symptoms (dysuria or discharge). No statistical significance was found for age, condom use, smoking, days since last sexual intercourse and previous GUM clinic attendance. No statistically significant difference to cost effective prevalence of 6% was shown.

Conclusions: A 5.9% prevalence of *Chlamydia trachomatis* was found which is cost effective to screen and treat. Non-invasive screening of men in the community was possible. Numbers of sexual partners and current symptoms were significant risk factors. Since only 25% of men in this laboratory were diagnosed with chlamydia outside the GUM clinic, compared with 59% of women, it is important that community screening of men is promoted.

Healthcare providers often see chlamydial infection, like other STDs, as a women's health issue, as its complications in women are well known. As a result, men are relatively ignorant about its transmission, prevention, and control.[1] No doubt this is partially because 50%–70% of infections in women[2] and 40%–50% of those in men[3] are clinically silent. Research in the United States and Sweden has shown that detection and treatment of asymptomatic infections in women result in a reduction of complications.[4 5]

The number of diagnoses of chlamydia has been consistently higher in women than men, by more than 30%.[6] In the Limerick regional laboratory in the 12 months up to October 2003, almost twice as many women (264/3851) as men (149/1496) were diagnosed positive. Over 75% of chlamydia positive men (112/149) were patients in the GUM clinic, compared to 41% of women (109/264). Screening men for chlamydial infection, especially those without symptoms has been considered problematic,[1] mainly because men are less likely than women to attend healthcare settings.[7] In the past, screening asymptomatic men was further hampered by the necessity for invasive sampling techniques.[1] The development of nucleic acid amplification tests (NAATs) using urine offers great potential for the screening of men, an important reservoir of infection for women, in epidemiological settings.

Cost effectiveness analyses have shown that screening becomes cost effective at prevalence ranging from 2% to 6%.[8–13] Screening outside of GUM clinics needs evaluating if a significant impact is to be made.[14] *Chlamydia trachomatis* fits the general prerequisites for disease prevention by screening: The disease is prevalent in the community, consequences of infection are severe, and no harm can come to the patient by taking part. The test is highly sensitive and specific, relatively cheap and has a rapid turnaround. Treatment is available, and there is a positive outcome for patients, partners and the community.

This cross sectional study was set up to estimate the prevalence of chlamydia infection in young men in the Mid-Western Health Board region of Ireland, and to determine risk factors for acquisition of the infection.

SUBJECTS AND METHODS

Study cohorts

Two populations were chosen, young men attending orthopaedic outpatient clinics (OPD) in the Mid-Western Regional Hospital, Limerick, and a mixture of students and general public attending sports facilities in the University of Limerick (UL). Cohorts were recruited intermittently but consecutively while researchers were in attendance. Men aged 17–35 who had ever been sexually active in their lifetimes and had not passed urine in the past hour were eligible for inclusion. Men were recruited from September 2002 to December 2002 in UL, and September 2002 to June 2003 in OPD. This study aimed to estimate an expected prevalence of 3.5% (SD 2.5%) (n = 208, UL and OPD).

Measures

Demographic details and risk factors were obtained from a self administered, confidential questionnaire. Informed consent was obtained. Contact details of patients were requested and a first pass urine specimen was collected. Questionnaires consent forms, and specimen containers were bar coded and retained. The researchers' contact details were given to the participants on an information sheet, which contained the

Abbreviations: FVU, first void urine; LCR, ligase chain reaction; NAATs, nucleic acid amplification tests

same bar code number for identification purposes. Urine specimens were chilled immediately, frozen to −20℃ within 4 hours, and individually analysed within 3 days by ligase chain reaction (LCR) assays (Abbott) as per manufacturer's instructions. All positive urines were confirmed by repeat LCR. Those who had positive tests were informed by mobile phone and email. An emergency appointment at the GU-STD clinic was given for patient and partner(s).

Statistical analysis

Statistical data were analysed by using SPSS V11. Means (age, number sexual partners, etc) were compared using *t* test. χ^2 tests were used to compare prevalence for each category variable. The overall prevalence was compared to prevalence of 2%,[10] 3.9%,[11] and 6%[12 13] (published cost effective prevalence) by calculating the ''z scores''; 95% confidence was regarded as significant for the study.

Ethical approval

Ethical approvals were received from the Mid-Western regional hospital ethics committee and the University of Limerick research ethics board.

RESULTS

Study cohort

In all, 186 men were recruited from UL (60% acceptance), and 207 men from OPD (82% acceptance). Table 1 displays the demographics of all participants in both cohorts and those who tested chlamydia positive.

Measures

There was no significant difference between the two cohorts for: (a) current symptoms (discharge or burning sensation while urinating) (UL 4%, OPD 5%), difference: 1% (95% CI: −3 to 5); (b) previous symptoms (UL 31%, OPD 21%), difference: 10% (95% CI: −5 to 9.5); (c) previous STD clinic attendance (UL 6%, OPD 7%), difference: 1% (95% CI: −8 to 10); (d) mean lifetime sexual partners (UL 9.3, OPD 10.7), difference: 1.4 partners (95% CI: −2.2 to 5.1); (e) mean days since last sexual intercourse (UL 44.4, OPD 53.0), difference 8.6 days (95% CI: −23.6 to 40.8).

There was a statistically significant difference found for the following factors: (a) mean sexual partners in the last 6 months (UL 2.3, OPD 1.7): difference 0.6 partners (95% CI: −1.1 to −0.08. p = 0.023); (b) age (UL 22.8, OPD 25.4 years): difference: 2.6 years (95% CI: 1.75 to 3.5. p<0.0005); (c) smokers (UL 26%, OPD 38%): difference 12% (95% CI: 3 to 21. p = 0.024); (d) condom users (UL 78%, OPD 56%): difference 18% (95% CI: 12 to 32. p = 0.001).

Prevalence

The overall prevalence of *Chlamydia trachomatis* was 5.9% (95% CI: 3.6 to 8.2). The prevalence in UL was 5.4% (95% CI: 2.1 to 8.6), and OPD was 6.3% (95% CI: 3.1 to 9.5). The difference of 0.9% (95% CI: −3.7 to 5.5) between the two cohorts was not statistically significant.

Chlamydia positive

Table 2 shows the demographic variables for chlamydia positive and negative men as a complete group.

The following risk factors were not found to be statistically significance for acquisition of chlamydia: (i) cohort studied (p = 0.83), (ii) age (p = 0.83), (iii) smoking (p = 0.24), (iv) condom use (p = 0.15), (v) previous symptoms (p = 0.15), (vi) previous STD clinic attendance (p = 0.22), (vii) mean days since last sexual intercourse (p = 0.58).

Table 1 Characteristics of the study populations and the *Chlamydia trachomatis* positive populations

	OPD		UL	
	Total (n = 207)	CT Pos (n = 13)	Total (n = 186)	CT Pos (n = 10)
Age (years)				
17–20	37 (17%)	2 (15%)	56 (30%)	4 (40%)
21–24	62 (30%)	3 (23%)	92 (49%)	4 (40%)
25–29	70 (34%)	6 (46%)	30 (16%)	2 (20%)
30–35	38 (18%)	2(15%)	8 (4%)	0
Smoking				
Yes	74 (38%)	4 (33%)	45 (26%)	2 (20%)
Missing data	19 (10% of total)	0	14 (8% of total)	0
Condom use				
Yes	111 (56%)	8 (62%)	133 (78%)	6 (60%)
Missing data	26 (13% of total)	0	15 (8% of total)	0
Symptoms				
Ever	42 (21%)	4 (31%)	53 (31%)	4 (40%)
Recent	10 (5%)	3 (23%)	7 (4%)	2 (20%)
Missing data	26 (13% of total)	0	17 (9% of total)	0
Last sexual intercourse				
1 Day	29 (15%)	3 (23%)	21 (13%)	1 (10%)
2–14 Days	78 (40%)	6 (46%)	62 (39%)	5 (50%)
15 Days to 1 month	22 (11%)	1 (8%)	24 (13%)	0
1–6 Months	36 (18%)	3 (23%)	43 (24%)	4 (40%)
1 Year	9 (5%)	0	4 (2%)	0
>1 Year	4 (2%)	0	4 (2%)	0
Missing data	32 (16% of total)	0	31 (21% of total)	0
Attended STD clinic				
Yes	14 (7%)	0	10 (6%)	2 (20%)
Missing data	23 (11% of total)	0	18 (10%)	0
6 Month sexual partners				
⩽1	124 (63%)	4 (31%)	87 (47%)	1 (10%)
>1	54 (27%)	9 (69%)	73 (41%)	9 (90%)
Missing data	11 (6% of total)	0	26 (15% of total)	0
Lifetime sexual partners				
⩽8	98 (50%)	3 (23%)	97 (52%)	3 (30%)
>8	67 (34%)	10 (77%)	50 (27%)	7 (70%)
Missing data	32 (16% of total)	0	39 (21% of total)	0

OPD, outpatients department; UL, university sports arena; CT Pos, *Chlamydia trachomatis* LCR positive; CT Neg, *Chlamydia trachomatis* LCR negative.

Table 2 Univariate analysis of demographics and behavioural factors with chlamydial infection

	CT Pos	CT Neg	
	No (%)	No (%)	p Value
Total	23	370	
Location			
OPD	13 (57%)	194 (52%)	0.830
UL	10 (43%)	176 (48%	
Age (years)			
17–20	6 (26%)	87 (24%)	
21–24	7 (30%)	147 (40%)	0.827
25–29	8 (35%)	92 (25%)	
30–35	2 (9%)	44 (12%)	
Smoking			
Yes	6 (26%)	113 (31%)	0.244
Missing data	0	33	
Condom use			
Yes	14 (61%)	230 (62%)	0.153
Missing data	0	41	
Symptoms			
Ever	8 (35%)	87 (24%)	0.149
Recent	5 (22%)	12 (3%)	<0.0005
Missing data	0	43	
Last sexual intercourse			
1–7 Days	12 (52%)	142 (53%)	0.578
8–14 Days	3 (13%)	35 (13%)	
15 Days to 1 month	2 (9%)	29 (11%)	
1–6 Months	6 (26%)	49 (18%)	
1 Year	0	5 (2%)	
>1 Year	0	8 (3%)	
Missing data	0	102	
Attended STD clinic			
Yes	2 (9%)	22 (6%)	0.223
Missing data	0	41	
6 Month sexual partners			
⩽1	5 (22%)	206 (65%)	<0.0005
>1	18 (78%)	109 (35%)	
Missing data	0	55	
Lifetime sexual partners			
⩽8	6 (26%)	189 (65%)	
>8	17 (74%)	100 (35%)	<0.0005
Missing data	0	81	

CT Pos, *Chlamydia trachomatis* LCR positive; CT Neg, *Chlamydia trachomatis* LCR negative; OPD, outpatients department; UL, university sports arena.

There was, however, a statistically significant increased risk of acquiring infection found for the men from the study who had: (i) more than one sexual partner in the last 6 months ($p \leqslant 0.0005$), (ii) more than eight sexual partners in their lifetime ($p \leqslant 0.0005$), (iii) current symptoms ($p \leqslant 0.0005$).

Cost effectiveness

Screening for *Chlamydia trachomatis* has been shown to be cost effective at 2%[10] 3.9%[11] and 6%.[12 13] Table 3 shows comparisons between our prevalence and the above prevalence by the use of "z" scores. There was no statistically significant difference from prevalence of 6% found in any group. For the total group there was a significant difference of 2% and 3.9% found.

DISCUSSION

This, to our knowledge, is the first time community screening of men has been undertaken in Ireland. The prevalence in this study of 5.4% in UL and 6.3% in OPD (overall 5.9%) is on a par with a Danish study (5.8%),[15] higher than UK studies (1.2%[16] to 2.2%[17 18]) though lower than a Canadian one (8%).[19] It should be noted that in the above studies with the exception of one,[17] participants were recruited from registers and specimens were "home mailed." In this study all men were recruited on site.

A larger proportion of people were represented in the 17–24 year age group in UL (79%) than in OPD (48%), while more than twice as many were represented in the 25–35 year age group in the OPD group. This age difference between the two groups was shown to be statistically significant. Only two

Table 3 Comparison of prevalence found with published cost effective prevalence. Only p values of the significant figures are given

	Z scores		
Location (prevalence)	2.0% Prevalence	3.9% Prevalence	6.0% Prevalence
UL (5.4%)	3.31 (p=0.001)	1.06	−0.03
OPD (6.3%)	4.42 (p=0.0001)	1.78	0.18
Total (5.9%)	5.52 (p=0.0001)	2.05 (p=0.05)	−0.08

OPD, outpatients department; UL, university sports arena.

Chlamydia trachomatis positive men were found in the 30–35 year age group. This is in contrast with recent London studies in which their highest prevalence was in 30–35[20] and 25–34 year old men.[21] No statistical significance was shown for age groups in this study.

The difference (33%, $p = 0.024$) between the two cohorts for smoking may be as a result of the UL sample being recruited from a sports arena. More use of condoms in this cohort (15%, $p = 0.001$) might be as a result of a lower age group, better sexual health education, or more partner change as reflected in the number of partners in the last 6 months, though it was not statistically significant. However, no statistical significance was shown for those who were infected for either of the above risk factors.

Current symptoms were found to be significant in predicting chlamydia infection ($p \leqslant 0.0005$), even though only 22% of the positive participants reported recent symptoms. Interestingly, 3% of the negative participants indicated similarly, but no other infections were sought.

No statistical difference was found between the two groups or within the groups for chlamydial infection for any length of time since last sexual intercourse (see table 1). It is interesting to note that 26% (6/23) of patients who tested positive reported no sexual intercourse for a range of 6 weeks to 6 months (42, 42, 48, 60, 60, 180 days). This must indicate persistence of infection for at least this period in these men, though the frequency of prolonged infection is unknown, as no study has consistently evaluated men for more than 4 weeks of infection.[22]

Previous attendance at GUM clinics (OPD7%, UL 6%) were similar for the two cohorts, and were not different from the UK National Survey of Sexual Attitudes and Lifestyles (NATSSAL) which showed 7% previous GUM attendance, while a north west London study of men in the community found 20%.[20]

In both cohorts, 10% had been monogamous in their lifetimes, and no chlamydia positive man was found in this group. More than one sexual partner in the last 6 months and greater than eight lifetime sexual partners were statistically significant ($p \leqslant 0.0005$) for chlamydial infection.

Cost effectiveness

The most evidence available supports cost effectiveness for screening and treating in the community at 6% prevalence.[12 13] The figures here show that the prevalence is not significantly less than 6%. This would indicate that screening and treating the men in the mid-west of Ireland aged between 17 and 35 years who have been sexually active in their lifetimes would be cost effective.

Refusals

Considering 25–35% of people generally refuse to engage in face to face interviews designed to investigate sexual attitudes and lifestyles,[18] getting refusal rates for a study requiring a specimen as well as a questionnaire of 30% (169/562) is acceptable. There was a greater refusal rate in UL (40%, 124/310) than OPD (18%, 45/252), but both rates compare well against refusal rates of 35[21] to 71[16]% for postal surveys. Most non-participants did not give a reason (65%, 110/169), with ''not at risk'' (51%, 30/59) and ''no time'' (39%, 23/59) being the main ones.

Limitations

The target size of 208 participants was very nearly achieved for both cohorts, and this sample size is less than most other studies cited. It may be possible that neither of the two study populations may be representative of all men aged 17–35 in the region. However, the number of chlamydia positive men in both cohorts was small (n = 10, 13), so the even distribution of infection in the age groups may be unreliable.

Omissions from the questionnaire included recent antibiotic use, ethnic group, and sexual preference.

Strengths

This is the first community based chlamydia prevalence study in men performed in Ireland. Unlike a London study,[21] the use of a non-invasive screening test in the community with molecular methods proved to be feasible. Of those who participated, over 99% made the decision to take part immediately, even though they were given the opportunity to take the information and return if they wished. Telephones proved to be the most popular (70% mobile, 8% land line) and confidential means of contact, followed by email (32%). All criteria for a good screening programme were found to be satisfied.

CONCLUSION

A 5.9% prevalence of *Chlamydia trachomatis* was found in 17–35 year old men in the mid-west region of Ireland . The only risk factors of statistical significance found were (1) more than one sexual partner in the last 6 months, (2) more than eight lifetime partners, (3) current symptoms (discharge or burning sensation while urinating). Non-invasive screening of men in the community was shown to be feasible in the populations selected. Since only 25% (37/149) men in this laboratory were diagnosed with chlamydia from outside the GUM clinic, compared to 59% (155/264) of women, it is important that we continue to find new ways to identify these men, who represent a significant reservoir of infection for women.

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CONTRIBUTORS

JP carried out fieldwork, data collection, and laboratory analysis; JP and COC prepared the study design, carried out fieldwork and analysis, and prepared the paper; MOH carried out fieldwork; JS did statistical analysis; JdF was the guarantor of the study.

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