

tive sign of overdosage could be observed. However, it has to be kept in mind that some of the other drugs simultaneously consumed might have influenced the course of intoxication.

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## Gonorrhoea in Heterosexual Men

### *Correlation between Gonococcal W Serogroup, Chlamydia trachomatis Infection and Objective Symptoms*

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Rudén A-K, Bäckman M, Bygdeman S, Jonsson A, Ringertz O, Sandström E. Gonorrhoea in heterosexual men. Correlation between gonococcal W serogroup, *Chlamydia trachomatis* infection and objective symptoms. Acta Derm Venereol (Stockh) 1986; 66: 453-456.

Among 292 heterosexual men with gonorrhoea seen during one year, 59 (20%), had a co-existing chlamydial infection. Of the men infected with a serogroup W I strain 30% had a chlamydial infection compared with 16% of those infected with a serogroup W II/III strain ( $p < 0.01$ ). Heterosexual men infected with W I strains had less objective symptoms as judged by the number of leucocytes per high power field and by discharge, than men infected with W II/III strains ( $p < 0.05$  and  $p < 0.01$ , respectively). *Key word: Monoclonal antibodies.* (Received March 17, 1986.)

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Serological classification of *Neisseria gonorrhoeae* by co-agglutination has recently been developed (1). With monoclonal antibodies the gonococci can be divided into two serogroups, W I and W II/III and further subdivided into serovars (2, 3). The serogroup W antigen, the major outer membrane protein, protein I, exists in two forms with different molecular weights (4). Serogroup W I and W II/III correspond to the two different proteins, protein IA and IB respectively.

A high frequency of co-existing chlamydial infection in patients with gonorrhoea is well-known (5, 6, 7). Approximately 20% of heterosexual men with gonorrhoea also have a chlamydial infection.

The purpose of this study was to investigate, if the serogroup of gonococcal isolates from heterosexual men with uro-genital gonorrhoea was correlated to a co-existing chlamydial infection and urethral symptoms.

## MATERIAL AND METHODS

The venereal disease outpatient clinic at the Department of Dermatology-Venereology, Södersjukhuset, Stockholm, was attended during one year up to April 1983, by 312 consecutive heterosexual men

with a positive gonococcal culture from the urethra. In 20 of these 312 men, who were considered for this study, chlamydial culture was not performed. The remaining 292 patients were included in the study. One of the men had two gonococcal strains of different serogroups isolated on the same occasion. The study thus comprised 293 gonococcal isolates from 292 men.

All patients were asked about sexual preference and their reason for attending the clinic. They were also asked about subjective symptoms from the urethra.

Smears from the urethra were taken and stained with methylene-blue. The number of leucocytes per high power field (HPF) ( $\times 100$  objective) were counted. The counts were graded:  $< 10$ , or  $\geq 10$  leucocytes per HPF. Objective discharge was recorded by the venereologist according to a three-graded scale, where grade two and three were classed as objective fluor.

Specimens for chlamydial and gonococcal cultures were taken from the urethra. Specimens for *Chlamydia trachomatis* culture were incubated onto McCoy cells, treated with cycloheximide and stained with iodine after three days of incubation (8). The gonococcal specimens were directly inoculated onto selective and non-selective hematin agar plates and incubated in 5% CO<sub>2</sub> atmosphere at 37°C. Gonococci were identified by microscopy, oxidase test and carbohydrate utilization tests (9).

All gonococcal isolates were serogrouped by co-agglutination (1). Monoclonal antibody reagents were used for the identification of serogroup W I and W II/III respectively (2, 3). All isolates were typable and no isolate reacted with both W I and W II/III reagents.

Fisher's exact test was used for statistical analysis.

## RESULTS AND DISCUSSION

The dominating gonococcal serogroup was W II/III with 204/293 (70%) of the isolates (Table I). This is in agreement with the findings in heterosexual men reported earlier (10).

In the study 20% of the patients had a chlamydial infection (Table I). There was a difference in incidence of chlamydial infections in patients infected with gonococcal strains of the two different serogroups. Thus, 30% of the patients infected with W I strains also had a co-existing chlamydial infection as compared with 16% of those infected with W II/III strains ( $p < 0.01$ ). There was no difference between the two groups of patients in the number attending for urethral symptoms, 77/89 (86%) of men infected with W I strains and 178/204 (87%) of those infected with W II/III strains. However, men infected with W I strains had less objective symptoms as judged by the number of leucocytes per HPF and less objective discharge than men infected with W II/III strains. In men with W I isolates 67/76 (88%) had 10 leucocytes/HPF or more compared with 185/193 (96%) of those with W II/III isolates (Table II), ( $p < 0.05$ ). Also objective discharge was seen more seldom in patients infected with W I strains, 41/68 (60%), than in those infected with W II/III strains, 136/173 (79%), ( $p < 0.01$ ), (Table II). No statistical significance was noted concerning the result of chlamydial culture in relation to objective findings.

Table I. Serogroup of 293 gonococcal isolates from 292 heterosexual men with uro-genital gonorrhoea correlated to a co-existing chlamydial infection.

Chlamydial culture	Gonococcal isolates of serogroup					
	W I		W II/III		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Positive	27	30	32	16	59	20
Negative	62 <sup>a</sup>	70	172 <sup>a</sup>	84	234	80
Total	89		204		293	

<sup>a</sup> One patient was infected with one W I and one W II/III strain.

Table II. Serogroup of gonococcal isolates correlated to number of leucocytes/HPF ( $\times 100$  objective) in urethral smear and objective discharge from 268 and 240 men, respectively, with uro-genital gonorrhoea

Data concerning number of leucocytes/HPF and objective discharge were not available from 24 and 52 men respectively

Gonococcal serogroup	Objective findings					
	Number of leucocytes/HPF			Objective discharge		
	<10	$\geq 10$	Total	No	Yes	Total
WI	9	67 <sup>a</sup>	76	27	41 <sup>a</sup>	68
WII/III	8	185 <sup>a</sup>	193	37	136 <sup>a</sup>	173
Total	17	252	269	64	177	241

<sup>a</sup> One patient was infected with one WI and one WII/III strain.

Women were not included in this report because chlamydial culture was not taken in 89 (29%) of the 310 women with uro-genital gonorrhoea originally considered for the study. There was, however, the same results concerning gonococcal serogroup and co-existing chlamydial infection in women as in heterosexual men. Forty-eight per cent of the women with gonococcal isolates of serogroup WI and thirty per cent with WII/III isolates also had a chlamydial infection ( $p < 0.01$ ). Among 38 homosexual men with uro-genital gonorrhoea, from whom specimens for chlamydial culture were taken, only 2 had a chlamydial infection.

These findings might be explained by epidemiological factors or biological interaction. Men infected with WI strains had less objective symptoms than those infected with WII/III strains and this might have delayed their decision to visit a doctor. During the rather long period, when they were undiagnosed, they would have had a greater opportunity to acquire a chlamydial infection than patients infected with WII/III strains. An already acquired chlamydial infection might also during this period develop into a phase where it can be diagnosed by culture.

Furthermore biological differences between WI and WII/III strains might facilitate the co-existence between WI strains and *Chlamydia trachomatis*. It has earlier been shown, that gonococcal strains causing asymptomatic gonorrhoea in men often belong to a special auxotype with unique nutritional requirements, i.e. AHU<sup>-</sup> (11). It has also been shown that AHU<sup>-</sup> strains mostly belong to serogroup WI (12). Chlamydial infection might thus be favoured by an environment suitable for WI strains with unique nutritional requirements.

Alternatively a low-grade persistent chlamydial infection, present for a long time, might be reactivated by a gonococcal infection with WI strains.

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