Sensitivity to penicillin of gonococci in different racial groups

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SUMMARY The distribution of the sensitivity to penicillin of gonococci isolated from 631 men and 290 women was analysed in relation to the racial origin of the patients and the type of source contact alleged by the men. No difference in the sensitivity patterns was found between strains from white patients from the United Kingdom and those from immigrants from the Caribbean area. Asian men harboured significantly more insensitive strains than men of other racial groups. Men of Caribbean stock who had been born in this country had significantly more infections due to fully sensitive strains. The reasons for these variations are not known, but one contributory factor may be differences within the racial groups in the proportions of infections contracted from prostitutes.

Introduction

In a nationwide study of gonorrhoea carried out in the United States between 1972 and 1975 Thornsberry *et al*¹ found a significantly higher proportion of strains which were relatively insensitive to penicillin—with minimum inhibitory concentrations (MICs) of penicillin between 0.125 and 0.25 µg/ml—among black patients than in white men and women, although the proportion of more resistant isolates (MIC ≥0.5 µg/ml) was similar in both races and sexes. Reasons suggested to account for this difference were possible selective factors, such as the tendency for relatively resistant strains to produce symptomatic infections and the degree of motivation in different racial groups to seek treatment, variations in the provision of treatment facilities in different communities, and variations in the distribution of sensitivity of gonococci to antibiotics in different geographical areas. Silver and Darling,² working at Bolton in the UK, found that gonococcal strains isolated from a small group of coloured immigrants were significantly less sensitive to penicillin than those from non-immigrants in the same area.

In view of these reports a retrospective study was carried out to see whether there were any differences in the distribution of sensitivity of gonococci to

penicillin among patients of different racial groups who had attended a venereal disease clinic in London.

Materials and methods

Strains of *Neisseria gonorrhoeae* isolated before treatment from 631 men and 290 women who attended the Whitechapel Clinic of the London Hospital between 1976 and 1978 were tested for susceptibility to penicillin by a plate dilution method.³ The identity of all the isolates was confirmed by an oxidase test and the production of acid from glucose but not from maltose, lactose, or saccharose. The patient's race and country of birth were noted as well as, in the men, the type of sexual contact from whom the infection was thought to have been acquired. The number of patients studied represented about 20% of the total number of patients with gonorrhoea who attended the clinic during the period reviewed. All isolates from patients attending during certain consecutive months in each of the years 1976, 1977, and 1978 were tested, but there was no other selection.

The χ^2 test was used to examine differences in the distribution of the sensitivity of strains within racial and other groups.

Results

STRAIN SENSITIVITIES

These are summarised in tables I and II. Gonococcal strains with an MIC of ≤0.004-0.015 µg/ml were

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TABLE I Sensitivity of gonococci to penicillin in racial groups (1976-78)

Racial group	No	MIC ($\mu\text{g/ml}$)					
		$\leq 0.004-0.015$		$0.03-0.06$		$0.125-\geq 0.5$	
		No	%	No	%	No	%
Men:							
UK and Eire	227	134	59.0	49	21.6	44	19.4
UK coloured	40	33	82.5	4	10.0	3	7.5
Caribbean negro	208	125	60.1	43	20.7	40	19.3
African negro	32	13	40.6	10	31.2	9	28.1
Asian*	55	13	23.6	26	47.3	16	29.1
Miscellaneous	69	38	55.1	14	20.3	17	24.6
Total	631	356	56.4	146	23.1	129	20.4
Women:							
UK and Eire	202	122	60.4	44	21.8	36	17.8
UK coloured	20	14	70.0	3	15.0	3	15.0
Caribbean negro	53	37	69.8	9	17.0	7	13.2
African negro	4	2		2		0	
Asian*	1	0		0		1	
Miscellaneous	10	6		1		3	
Total	290	181	62.4	59	20.3	50	17.2

*Indian, Bangladeshi, and Pakistani patients

TABLE II Distribution of sensitivity to penicillin in strains in men from different sources of infection

MIC ($\mu\text{g/ml}$)	Strains		Source of infection											
			Prostitute		Casual		Friend		Marital		Homosexual			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
$\leq 0.004-0.015$	356	56.4	27	48.2	234	55.1	73	63.5	12	80.0	10	50.0		
$0.03-0.06$	146	23.1	14	25.0	105	24.7	22	19.1	3	20.0	2	10.0		
$0.125-\geq 0.5$	129	20.4	15	26.8	86	20.2	20	17.4	0		8	40.0		
Total	631	100	56	100	425	100	115	100	15	100	20	100		

classified as fully sensitive, those with an MIC of $0.03-0.06 \mu\text{g/ml}$ as of intermediate sensitivity, and those with an MIC of $\geq 0.125 \mu\text{g/ml}$ as being relatively insensitive. There were no significant differences between the distribution of these three groups of strains between male or female white patients from the United Kingdom and Eire and those from the Caribbean. However, the male UK coloured patients (those of Caribbean stock who had been born and had grown up in the UK) had significantly more fully sensitive strains than white UK men ($\chi^2_1 = 8.0$, $P = < 0.01$). No difference in the frequency of fully sensitive strains was found between the male and female UK coloured patients ($\chi^2_1 = 1.28$, $P = < 0.3$, > 0.2). Asian male patients (from India, Bangladesh, and Pakistan) were infected with significantly more intermediate and relatively insensitive strains than the other racial groups ($\chi^2_2 = 28.9$, $P = < 0.01$). These strains were also found more frequently in the male African negroes, but when compared with the remainder of the male patients the difference was not significant at the 0.05 level.

SOURCES OF INFECTION

The sources of infection of the male patients are shown in table III. Excluding homosexually acquired infections, the Asian patients gave prostitutes as their contacts more often than the other groups ($\chi^2_1 = 28.8$, $P = < 0.01$). Caribbean men and male UK coloured patients had relatively fewer infections from prostitutes than the male group as a whole ($\chi^2_1 = 5.5$, $P = 0.02$; and $\chi^2_1 = 4.3$, $P = < 0.05$, > 0.02 respectively). Although there were differences in the distribution of the three sensitivity groups in the men infected by different types of female source contacts (table II), these were not significant ($\chi^2_6 = 9.3$, $P = < 0.3$, > 0.2). There was a tendency for the less sensitive strains to be found most often in the contacts of prostitutes, then in declining order, casual contacts, friends, and wives; this may perhaps reflect a gradient of promiscuity within these female groups.

Discussion

In contrast to the findings in the United States, no

TABLE III Sources of infection in men

Racial group	No	Prostitute		Casual†		Friend‡		Marital§		Homosexual	
		No	%	No	%	No	%	No	%	No	%
UK and Eire	227	15	6.6	139	61.2	49	21.6	8	3.5	16	7.0
UK coloured	40	0		29	72.5	10	25.0	1	2.5	0	
Caribbean negro	208	11	5.3	161	77.4	32	15.4	3	1.4	1	0.5
African negro	32	4	12.5	15	46.9	12	37.5	0		1	3.1
Asian*	55	16	29.1	34	61.8	3	5.4	2	3.6	0	
Miscellaneous	69	10	14.5	47	68.1	9	13.0	1	1.4	2	2.9
Total	631	56	8.9	425	67.3	115	18.2	15	2.4	20	3.2

*Indian, Bangladeshi, and Pakistani patients

†Relationship lasting less than one month

‡Relationship for at least one month

§Including common law wife

difference was found in the distribution of sensitivity to penicillin of gonococci recovered from UK white patients and negro immigrants from the Caribbean area. Asian men however harboured significantly more strains of reduced sensitivity. It seems likely that these findings are mainly the result of differences in social behaviour. It was at first thought that the frequency with which prostitutes were the source of infection might provide an explanation, but this was not born out when the sensitivity patterns were related to the different types of sexual contact, although there was some suggestion that it might be a contributory factor. Asian patients sometimes seek treatment from local general practitioners and it is possible that a process of antibiotic selection might have operated so that those with less sensitive strains would eventually reach the clinic when the initial treatment had failed. However, only one of the Asian men admitted having taken antibiotics shortly before

his attendance. We cannot explain why UK-born coloured men had significantly more of the highly sensitive strains, but it may be relevant that none admitted to a prostitute being his source of infection.

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References

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