

# Hepatitis B antigen in prostitutes

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Several reports have shown that the frequency of HB Ag-positive acute viral hepatitis infections is increased in young adults with no history of parenteral exposure (Prince, Hargrove, Szmunness, Cherubin, Fontana, and Jeffries, 1970; Papaevangelou, Kourea, and Tsoukas, 1971; Fulford, Dane, Catterall, Woof, and Denning, 1973). A high frequency of HB Ag-positive hepatitis cases was also found among homosexuals (Vahrman, 1973) and evidence has been presented that hepatitis B may spread between sexual partners (Hersh, Melnick, Goyal, and Hollinger, 1971).

These data are compatible with the hypothesis that sexual transmission may play an important role in the spread of hepatitis B.

Prostitutes can be considered as the group at highest risk for sexually-transmitted diseases. The study of the HB Ag carrier rate in prostitutes in a high HB Ag prevalence urban area like Athens, could provide further support for the hypothesis of sexual transmission of hepatitis B. The results of such an investigation are reported in the present paper.

## Material and methods

Sera were collected from 293 prostitutes of the Greater Athens' area, during the spring of 1973. Prostitutes were regularly referred to us for medical examination. Their

main demographic and occupational characteristics as well as the results of the medical examinations were kept on a special record, which provided all the necessary data for the present investigation. Their ages ranged between 20 and 51 yrs (mean 31.1).

An unselected sample of 379 pregnant women, who were delivered at the 'Alexandra' maternity hospital at Athens, served as controls. They were of relatively low socioeconomic level and of similar age (mean 27.7 yrs).

HB Ag was detected by the techniques of counter-immuno-electrophoresis (Pesendorfer, Krassnitzky, and Wewalka, 1970) and immunodiffusion (Prince, 1968). The WR and the RPR card test\* were used for detecting serological evidence of syphilis. Serum glutamic pyruvic transaminase (SGPT) was determined by a modification of the method of Reitman and Frankel (1957).

## Results

HB Ag was detected in thirteen (4.4 per cent.) prostitutes and thirteen (3.4 per cent.) controls ( $P > 0.1$ ). Two of the HB Ag-positive prostitutes and one of the controls had SGPT values above normal limits, but less than 100 units.

In both prostitutes and controls a trend towards a decrease in HB Ag carrier rate with age was found (Table I; Fig. 1). The prevalence of HB Ag was higher in prostitutes than in controls in every age group studied. Thus, for those aged up to 24 years,

Received for publication October 28, 1973

\*Hynson, Westcott, and Dunning, Inc., Baltimore, Maryland

TABLE I *Prevalence of HB Ag and syphilis among prostitutes and controls\**

Age group (yrs)	Controls			Prostitutes				
	Total no.	HB Ag-positive		Total no.	HB Ag-positive		Syphilis-positive	
		No.	Per cent.		No.	Per cent.	No.	Per cent.
-24	148	7	4.7	18	2	11.1	2	11.1
25-29	106	4	3.8	73	4	5.5	7	9.6
30+	125	2	1.6	195	5	2.5	35	17.9
Not known	0	0	—	7	2	—	1	—
Total	379	13	3.4	293	13	4.4	45	15.4

\*All controls were negative for syphilis

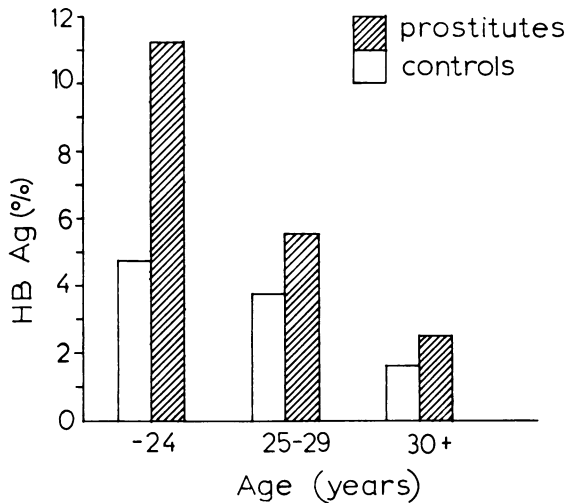


FIG. 1 Hepatitis B antigen (HB Ag) prevalence in prostitutes and controls, by age

the frequencies were 11.1 per cent. for prostitutes and 4.7 per cent. for controls. The corresponding rates were 5.5 and 3.8 per cent. for those aged 25 to 29 years and 2.5 and 1.6 per cent. for those aged 30 years or more.

Further analysis of the findings by years in prostitution showed a substantial increase in the HB Ag carrier rate during the first 5 years. The prevalence increased from 3.5 per cent. in the first year to about 12 per cent. by the fourth year, but decreased substantially when the duration of prostitution was longer than 5 years (Table II; Fig. 2).

The presence of a documented history of syphilis and past or present serological evidence of syphilis by age is shown in Table I. In contrast to the HB Ag carrier rate, evidence of past or present syphilis increased with age from 11.1 per cent. for those aged up to 24 years to 17.9 per cent. for those aged 30 years or more. The increase with years in prostitution was even more marked—from 6.9 per cent. in the first year to 17.4 per cent. when the duration was longer than 5 years (Table II; Fig. 2).

## Discussion

Recent studies indicate that non-parenteral transmission may play a role in the spread of hepatitis B (Cossart, 1971). Several reports suggest that infection with HB Ag may occur by inhalation, ingestion, and close or sexual contact (Krugman and Giles, 1970; Almeida, Chisholm, Kulatilake, MacGregor, Mackay, O'Donoghue, Shackman, and Waterson, 1971).

TABLE II Prevalence of HB Ag and syphilis, by years in prostitution

Duration of prostitution (yrs)	Total no.	HB Ag-positive		Syphilis-positive	
		No.	Per cent.	No.	Per cent.
<1	29	1	3.5	2	6.9
1-2	30	4	13.3	1	3.3
3-4	26	3	11.5	4	15.4
5+	178	3	1.7	31	17.4
Not known	30	2	—	7	—
Total	293	13	4.4	45	15.4

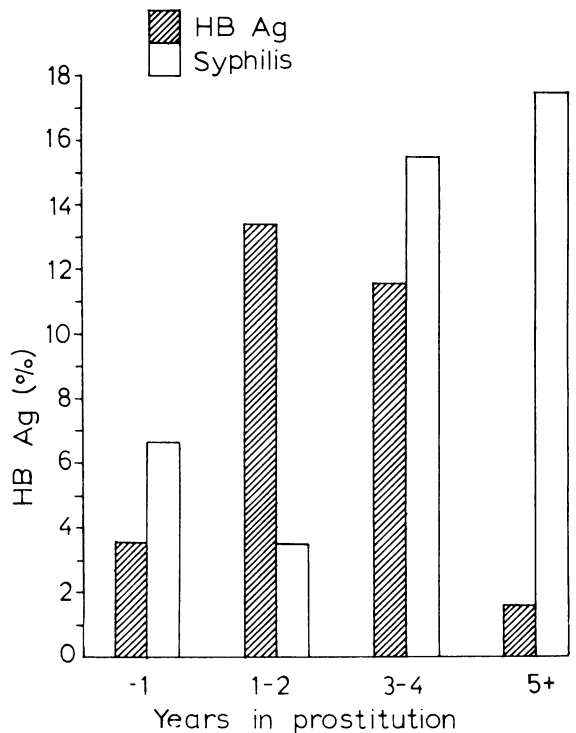


FIG. 2 Hepatitis B antigen (HB Ag) and syphilis prevalence, by years in prostitution

The following data stress the importance of sexual transmission:

(1) HB Ag is more frequently detected in young adult patients with hepatitis. Prince and others (1970) reported that 55 per cent. of adult hepatitis patients with no history of parenteral exposure were HB Ag-positive. Papaevangelou and others (1971) found that the highest frequency of HB Ag occurred in patients aged 20 to 29 years.

(2) Hepatitis B may spread between sexual partners (Hersh and others, 1971; Heathcote and Sherlock, 1973).

(3) HB Ag is more frequently found in homosexuals with hepatitis (Vahrman, 1973), and the HB Ag carrier rate is high in homosexuals (Jeffries, James, Jefferiss, Macleod, and Willcox, 1973).

(4) Promiscuity increases the probability of having HB antibody (HB Ab) (Fulford and others, 1973).

Prostitutes should constitute a suitable group in which to assess the importance of promiscuity. The increased HB Ag prevalence in prostitutes was not significantly different from that in controls. Similarly, Jeffries and others (1973) could not prove venereal spread among heterosexuals, and Fulford and others (1973) reported that promiscuity does not seem to increase the probability of being a HB Ag carrier. However, we believe that there is sufficient evidence for sexual transmission of hepatitis B. This is further supported by our finding of a higher carrier rate in prostitutes than in controls in each of the different age groups as well as an increase during the first years in prostitution.

Genetic as well as environmental factors are associated with the establishment of a permanent HB Ag carrier state (Blumberg, Sutnick, and London, 1969). The carrier state is self-limiting in some individuals (Szmuness, Prince, Brotman, and Hirsch, 1973). Thus the HB Ag carrier rate does not denote the cumulative past experience of hepatitis B. This may explain the decrease of HB Ag prevalence with age and the contrast between HB Ag and syphilis findings. HB Ab studies may be more appropriate for the establishment of the observed associations. Such studies are now in progress.

Our data provide no information regarding the mechanism of sexual transmission. Skin and mucous membrane lesions, commonly present in prostitutes, may play a role in transmission. HB Ag carriers are infectious, especially when there is some evidence of liver dysfunction (Reinicke, Dybkjaer, Poulsen, Banke, Lylloff, and Nordenfelt, 1972). It therefore seems possible that prostitutes may play a role in the spread of hepatitis B in urban populations.

## Summary

The hepatitis B antigen (HB Ag) carrier rate was studied in a sample of 293 prostitutes in Athens, and 379 women of similar age and relatively low socio-economic level served as controls. HB Ag was detected in thirteen (4.4 per cent.) of the prostitutes and thirteen (3.4 per cent.) of the controls, a difference which was not statistically significant. The prevalence decreased with age in both groups, but was higher in prostitutes than in controls in each age group studied. The HB Ag carrier rate increased

from 3.5 per cent. in the first year to about 12 per cent. by the fourth year of prostitution but dropped after this. These data, although inconclusive, lend some support to the suggestion that sexual transmission may be of importance in the spread of hepatitis B in urban populations.

This study was supported in part by a grant from the Office of Scientific Research and Development, Ministry of Culture and Sciences.

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## Antigène de l'hépatite B chez les prostituées

### SOMMAIRE

Le taux de sujets porteurs de l'antigène de l'hépatite B (HB Ag) a été étudié sur un échantillon de 293 prostituées à Athènes avec, comme témoins, 379 femmes d'âge similaire et d'un niveau socio-économique relativement bas. L'HB Ag a été trouvé chez 13 (4,4 pour cent) des prostituées et chez 13 (3,4 pour cent) des témoins, différence qui n'est pas statistiquement significative. Dans les deux groupes, la prévalence a diminué avec l'âge mais, pour chaque groupe d'âge étudié, fut plus

élevé chez les prostituées que chez les témoins. Le taux des femmes porteuses de l'HB Ag est passé de 3,5 pour cent lors de la première année de prostitution à environ 12 pour cent à la quatrième année pour diminuer ensuite.

Ces constatations, bien que non concluantes, donnent quelque soutien à la suggestion que la transmission sexuelle peut avoir de l'importance dans la diffusion de l'hépatite B dans la population urbaine.