

THE MEASUREMENT BY SEROLOGICAL MEANS OF THE IMPACT OF THE HONG KONG/68 INFLUENZA VIRUS ON A POPULATION

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SUMMARY: *In order to obtain evidence on the size of the impact of the Hong Kong/68 variant of influenza A2 virus on the population of São Paulo, Brazil, serum samples taken in 1967 before this variant appeared and during successive years after it appeared were examined for their antibody content. Haemagglutination-inhibition tests performed on a total of 2726 serum samples from adults showed a sharp decrease in 1969 of the proportion of sera without antibody to the Hong Kong/68 variant and a corresponding increase in the proportion with high titres. It was concluded that about three-quarters of the adult population became infected at some time after the variant appeared, the majority in the first year of prevalence.*

UNITERMS: *Hong Kong/68 influenza variant*; Haemagglutination-inhibition test*; Influenza A2 virus*.*

was expected to appear in the southern hemisphere sometime during the winter months from March onwards.

As anticipated, strains of the virus were isolated from sporadic cases of respiratory infection in Rio de Janeiro in March 1969, from cases of influenza in Belém, Pará, where a sharp increase in absenteeism was noted in schools and factories associated with a high incidence of acute respiratory illnesses, and from cases of influenza in São Paulo ***.

Since information was scanty on possible indices which might indicate the size of an epidemic of influenza (such as increased mortality rates), it was thought possible that the examination of sufficient serum samples taken before and after the appearance of the Hong Kong/68 variant might allow some estimation to be made of the impact of this virus on the population. To this end a serological study was done by the technique of haemagglutination-inhibition and the proportion calculated of the people who acquired antibody during the period that the virus was known to be circulating in the population.

INTRODUCTION

The Hong Kong/68 variant of influenza A2 virus spread widely in the northern hemisphere in the winter of 1968-69 and

MATERIALS AND METHODS

Serum samples which had been taken for studies on rubella virus from 487

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adults in São Paulo in 1967 and stored frozen since then, 980 samples obtained in 1969, 790 samples obtained in 1970, and 469 samples obtained in 1971 were treated with receptor destroying enzyme (filtrate of vibrio-cholerae) and tested by haemagglutination-inhibition test (HI) in plastic WHO haemagglutination trays.

Serum dilutions were mixed with 8 agglutinating doses of the Hong Kong/68 variant of influenza A2 virus and after one hour at room temperature a volume of 0.5% fowl cells was added. Serum titres were recorded as the reciprocals of the highest dilution showing complete inhibition of agglutination after 50 minutes.

Sera from 1967 and 1969 were tested simultaneously on every occasion to minimise variations due to differences in the other reagents in the test.

RESULTS

Over the 3 year period of the survey serum samples were taken from 2726 adults.

The 487 samples obtained in 1967 had been taken from adults aged 15 years to 35 years or over. These, taken before the Hong Kong/68 variant appeared, were used to produce a base line against which subsequent levels of antibody to this virus could be set. The 980, 790 and 469 samples collected, respectively, in 1969, 1970 and 1971 were obtained from adults within a similar age range. The distribution of haemagglutination-inhibiting antibody titres in all these samples to the Hong Kong/68 variant is shown in Table 1. The difference between the results with sera obtained in 1967 and those obtained in 1969, 1970 and 1971 is considerable, particularly in the proportions without any detectable antibody and in those with titres of 80 or higher. In Figure 1 the results are grouped and presented graphically to show these differences and to demonstrate the similarity in the proportion of sera with low titres between 10 and 40. The fall of approximately 42% in the proportion of negative sera between 1967 and 1969 and the rise of approximately 33% in the propor-

TABLE I

Distribution of the haemagglutination-inhibiting antibody titres for A2/Hong Kong/68 influenza virus in human sera collected in 1967-71

Titre	1967		1969		1970		1971	
	N.º	%	N.º	%	N.º	%	N.º	%
< 10	353	72.5	296	30.2	202	25.6	130	27.7
10	59	12.2	100	10.3	96	12.1	44	9.3
20	38	7.8	104	10.6	88	11.2	44	9.3
40	25	5.1	136	13.8	109	13.8	60	12.8
≥ 80	12	2.4	344	35.1	295	37.3	191	40.9
TOTAL	487	100.0	980	100.0	790	100.0	469	100.0

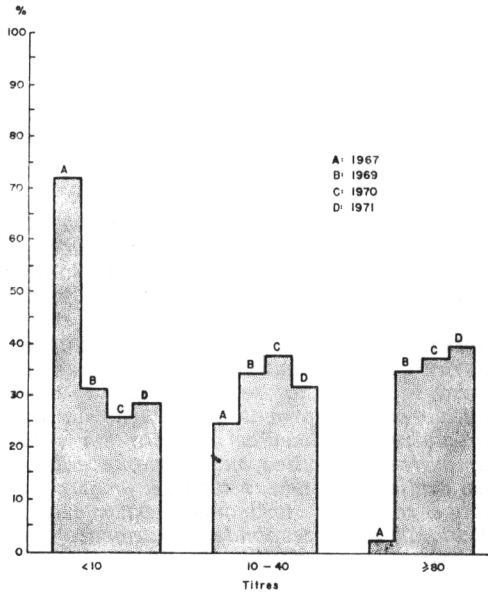


Fig. 1 — Distribution of the haemagglutination inhibiting antibody titres for A₂/Hong Kong/68 influenza virus in human sera collected in 1967-1971.

tion with high titres, gives some indication that the probable incidence of infection by the Hong Kong variant among the population was between 30% and 40%. An analysis of the results with sera obtained in 1969 and with those obtained in 1970 and 1971 shows no significant differences.

There was little alteration in the proportion of sera showing low titres throughout the period between 1967 and 1971 and it could be that such antibody levels might be protective and thus the group remained fairly constant during the prevalence of the Hong Kong variant.

The age distribution of sera with antibody titres of 80 or higher in the serum samples obtained during 1967 and 1969-71 is shown in Figure 2. The overall proportion of sera with titres of 80 or higher in 1967 was 2.4% against 35.1%, 37.3% and

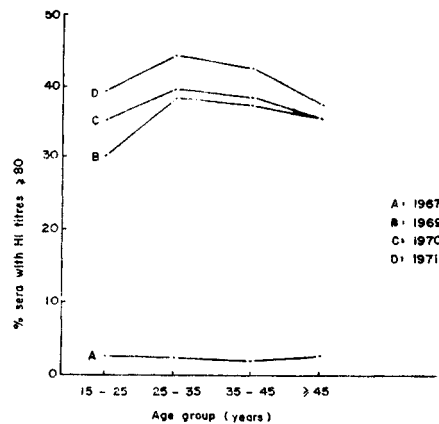
40.8% respectively in the years 1969, 1970 and 1971 (Table 1).

DISCUSSION AND CONCLUSION

The demonstration of the changing incidence of antibody to influenza over successive periods of time allows some estimation to be made of the impact of the virus in places where accurate epidemiological indices of influenza are difficult to obtain and measure.

The isolation of virus from patients with clinical illness is of importance in order to establish the identity of the circulating influenza variants but this will give little information on the scale of infection in the population as a whole.

The situation in São Paulo was such that it was clear that little evidence was available of the impact of the Hong



250	161	47	29	1967
250	263	259	208	1969
210	210	216	154	1970
182	171	64	52	1971
Number of sera examined				

Fig. 2 — Comparison of haemagglutination antibody titres ≥ 80 for A₂/Hong Kong/68 influenza virus in human sera, by age group.

Kong/68 variant other than that of a few scattered isolations of the virus which indicated the presence of the virus and reports of small outbreaks. Thus it was hoped that a serological study would enlarge considerably the epidemiological picture.

The results described here suggest that the A2/Hong Kong/68 virus had already spread quite extensively by the time the first strains were isolated early in 1969 as the proportion of sera without any antibody was considerably lower in February 1969 compared with samples collected in 1967. The increase in this period in the number of sera with high titres was equally striking.

The main rise in the proportion of sera with high antibody titres occurred in the first year of prevalence of the Hong Kong/68 virus. In the subsequent years the proportion increased only slightly and all age groups showed a similar small variation, with the age group 25-35 showing the highest proportion with high titres in each of the three years.

It is concluded that about three-quarters of the adult population appear to have been effectively immunised, the majority in the first year that the Hong Kong/68 virus appeared.

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RESUMO: *Objetivou-se evidenciar a intensidade da ação da variante Hong Kong/68 do vírus da influenza A2 sobre a população de São Paulo, Brasil. Para tanto, foram coletados soros em 1967, antes do aparecimento dessa variante e durante anos seguintes à sua presença, para investigação de seu conteúdo em anticorpos. As provas de inibição da hemaglutinação, levadas a efeito em 2726 amostras de adultos, mostraram acentuada declínio em 1969, relativo à proporção de soros sem anticorpos para Hong Kong/68 e correspondente aumento na proporção com títulos elevados. Conclui-se que cerca de tres quartos da população adulta adquiriu a infecção algum tempo após o aparecimento da variante, a maioria no primeiro ano de prevalência.*

UNITERMOS: *Virus influenza A2*; Hemaglutinação (prova de inibição)*; Variante Hong Kong/68*.*

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