

PREVALENCE OF ANTIBODIES TO THE BK AND JC PAPOVAVIRUSES IN ISOLATED POPULATIONS.

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ABSTRACT: A total of 173 sera from isolated Brazilian Indian populations, 39 from the Diauarun area, and 68 from the Alto Xingú area, respectively in the North and the South of the Xingú National Park and 66 Kren-Akorore Indians, were examined for hemagglutination — inhibiting (HI) antibodies against BK and JC viruses. The global percentages of positive sera ($\geq 1:40$) were 5.2% for BK virus and 1.7% for JC virus. The distribution of positive sera according to the population groups showed one individual to be positive for BK virus in the Diauarun Indians and none of the sera contained HI antibody to JC virus; in the Alto Xingú Indians, 4 were positive for BK virus and 3 others were positive for JC virus; as regards Kren-Akorore Indians none of the sera contained antibody to JC virus, and only 4 were BK positive. Due to the limited number of observations it was neither possible to determine the time of occurrence of seroconversion nor correlate the positivity rates for both viruses in the different tribes with the respective "contact" with the white population.

UNITERMS: Antibodies. Papovavirus. Polyoma virus. Indians, Brazil.

INTRODUCTION

The isolation of BK virus, a human papovavirus, from a patient with ureteric obstruction, after renal transplantation² and of another distinct virus belonging to the same group, the JC virus, from patients with progressive multifocal encephalopathy⁵, as well as the identification of a papovavirus related to SV40 in the brain of two patients with that encephalopathy⁹ and in one patient with a malignant melanoma⁸, suggest that in certain circumstances, papovaviruses seem to be related to human diseases. As far as BK virus is concerned,

seroepidemiologic studies of diverse populations carried out to date^{1,3,4,7} indicate that the virus is widespread, with overall prevalence in the range of 60-80%. Yet there is so far no evidence that BK virus causes clinical symptoms. In the study of Gardner et al², both donor and recipient had antibodies to the virus before transplantation and the patient developed a rise in antibody titers after the operation, which might suggest an ubiquitous distribution of BK virus and a viral activation consecutive to the immunosuppressive therapy required.

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The data about JC virus, in terms of HI antibody, suggest a similar world wide distribution, although each virus seems to behave independently⁷.

The purpose of this study is to determine the patterns of antibody prevalence to BK and JC viruses among isolated Brazilian Indians, using the hemagglutination-inhibition technique.

MATERIAL AND METHODS

Serum Samples — One hundred and seventy three specimens were obtained from 39 Indians living in the Diauarum area, 68 Indians living in the Alto Xingú and 66 Kren-Akorore Indians. Sera were separated in the field, and stored at 4°C for two or three days; they were transferred in styro-foam ice boxes to São Paulo, by air and stored at — 20°C until tested.

The examined population was divided into three groups according to age: 15 years and under, 16 to 35 years and 36 to 55 years. These Indians are representative of isolated populations which have their home territory south of the Amazon River. The Xingú National Park, situated in the north of the state of Mato Grosso, with an area of 22.000 Km², extends along the Xingú River from its headwaters to the von Martius waterfall, at its northern end.

The Park can be divided into two areas, according to its natural characteristics. The first to the north, is where the outpost of Diauarum is located and is largely Amazonian forest. The second to the south, is referred to as the Upper Xingú and consists predominantly of the topography of the Central Brazilian plateau-low vegetation with large expanses of plains containing many rivers and lakes.

There are 16 indigenous tribes which inhabit the Xingú National Park. They were considered, until now, to be in a relative state of isolation, many of the essentially native characteristics remaining intact.

Special reference should be made to the Kren-Akorore Indians who, until February 1973, were in a state of complete isolation

in the interior of the Amazonian forest. When a new road was planned to join Santarem in the North and Cuiabá in the South, through the Kren-Akorore Territory, it became urgent to contact this tribe. When this was succeeded it was verified that they were living under very primitive conditions having neither canoes, ceramics, nor dogs and were using stone age axes to cut down trees. After the opening of the road the Kren-Akorore were exposed to indiscriminate contact to civilized groups causing serious repercussions on their state of health. The result was that in January 1975, they were transplanted to the Xingú National Park, 200 Km to the East, situated in the Diauarum area. At that time they were examined by a team of physicians from the Escola Paulista de Medicina and blood was obtained for serological studies.

Hemagglutination-inhibition test — A total of 173 sera were examined for hemagglutination — inhibiting antibodies to BK and JC viruses in disposable microtiter plates (unit volumes of 0.025 ml) in which serial two fold dilutions were made, beginning at an initial dilution of 1:20, in phosphate-buffered saline pH 7.0. All sera were treated with RDE and inactivated at 56°C for one hour.

The BK virus, was obtained from Dr. Paul Brown and inoculated in Vero cell cultures. About three weeks after inoculation, the cell cultures showing a cytopathic effect of 75% were treated for preparation of hemagglutination antigen by freeze-thaw treatment. The titer obtained was 1:80 and 4 hemagglutination units were used in the test. The serum-virus mixture was incubated at 37°C for one hour. A 0.5% suspension in phosphate-buffered saline of human group "O" erythrocytes was then added and the plates were incubated at 4°C for one hour. A titer of at least 1:40 was considered significant.

The JC virus, was obtained from Dr. Duard Walker, as a hemagglutination antigen, with a titer of about 1:8000. We used an identical protocol to that used in the BK test, except that incubation of the

T A B L E 1
BK hemagglutination -- inhibiting antibodies in Brazilian Indian populations

Age (years)	Diauarum			Alto Xingú			Kren-Akorore			Total		
	No. tested	Positive		No. tested	Positive		No. tested	Positive		No. tested	Positive	
		No.	%		No.	%		No.	%		No.	%
≤ 15	2	0	0	10	1	10.0	25	1	4.0	37	2	5.4
16-35	19	1	5.2	41	2	4.8	36	3	8.3	96	6	6.2
36-55	18	0	0	17	1	5.8	5	0	0	40	1	2.5
Total	39	1	2.5	68	4	5.8	66	4	6.1	173	9	5.2

T A B L E 2
JC hemagglutination -- inhibiting antibodies in Brazilian Indian populations

Age (years)	Diauarum			Alto Xingú			Kren-Akorore			Total		
	No. tested	Positive		No. tested	Positive		No. tested	Positive		No. tested	Positive	
		No.	%		No.	%		No.	%		No.	%
≤ 15	2	0	0	10	0	0	25	0	0	37	0	0
16-35	19	0	0	41	0	0	36	0	0	96	0	0
36-55	18	0	0	17	3	17.6	5	0	0	40	3	7.5
Total	39	0	0	68	3	4.4	66	0	0	173	3	1.7

serum-virus mixture was carried out at room temperature for 30 minutes. Again a titer of at least 1:40 was considered significant.

RESULTS

The prevalence of HI antibodies to BK and JC viruses in different age groups and in the population studied are shown in Tables 1 and 2.

The overall rate of positive sera for BK virus was 5.2%, with individual rates of 5.4% in the age group of 15 years and under and 6.2% in the age groups of 16 years to 35 years, followed by 2.5% in the eldest group. Comparing these results with the JC antibody prevalence rates, the major differences are easily perceived, with a overall rate of positivity of 1.7%, no positive sera in the younger groups and a rate of 7.5% in the eldest group. An additional observation warrants mention. The two BK positive cases in the younger group were a girl aged 1 year (Alto Xingú) and a 13 year-old boy. (Kren-Akorore).

DISCUSSION

Of the 173 individuals studied 5.2% had HI antibodies against BK virus and 1.7%

against JC virus, which corroborate the observations of Brown et al¹ in relation to some small remote tribes of Brazil, Paraguay and Malaysia, where contact with these viruses seems to have been almost absent. This pattern is however quite different from the one we found in some cosmopolitan Brazilian groups, where 70% had HI antibodies against BK virus and 85% against JC virus², a distribution which confirms sero-epidemiologic studies in different regions of the world^{3,4,6,7}. The study of Brown et al¹, on the other hand refers a very high HI antibody prevalence in several populations of varying geographic isolation for BK and JC viruses, but considers that both viruses appear to behave independently at population as well as individual levels. In our study, although the number of positive observations is small, we never had the same individual simultaneously positive for both viruses. Probably due to the limited number of observations, in our study it was neither possible to determine the moment of occurrence of seroconversion nor to correlate the positivity rates for both viruses in different tribes with the respective "contact" with the white population.

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RESUMO: Foram estudados 173 soros de índios brasileiros, sendo 39 da área Diauarum, 68 do Alto Xingú e 66 índios Kren-Akorore. A pesquisa de anticorpos inibidores da hemaglutinação para os papovavirus BK e JC mostrou uma percentagem global de positividade (≥ 40) para os vírus BK de 5,2% e para o vírus JC de 1,7%. A distribuição dos soros positivos segundo sua origem foi a seguinte: dos 39 índios Diauarum somente um apresentou título significante para o vírus BK e nenhum deles foi positivo para o vírus JC; dos 68 índios do Alto Xingú, 4 apresentaram título significante para o vírus BK e 3 para o vírus JC, sendo estes últimos diferentes dos indivíduos positivos para o vírus BK; dos 66 índios Kren-Akorore, 4 mostraram possuir título significante para o vírus BK, sem positividade para o vírus JC. O número reduzido de soros não permitiu estabelecer o momento da seroconservação, em termos de idade, como não permitiu relacionar as taxas de positividade com o maior ou menor "contato" com a população branca.

UNITERMOS: Anticorpos. Papovavirus. Vírus BK. Índios brasileiros.

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